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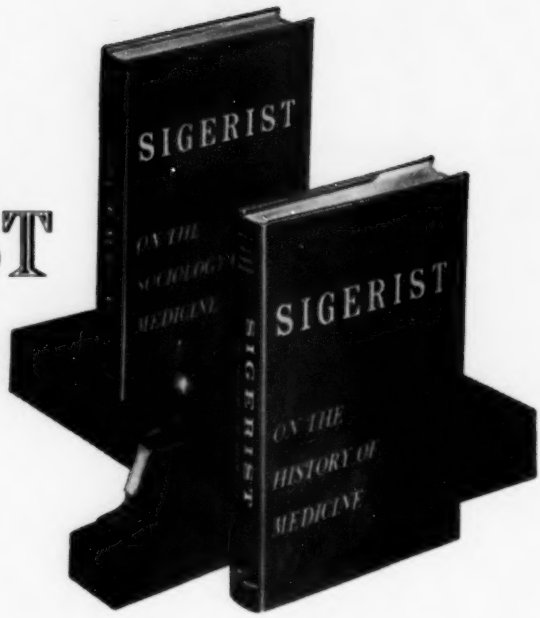

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Professor and Chairman of the Department of the History of Medicine,
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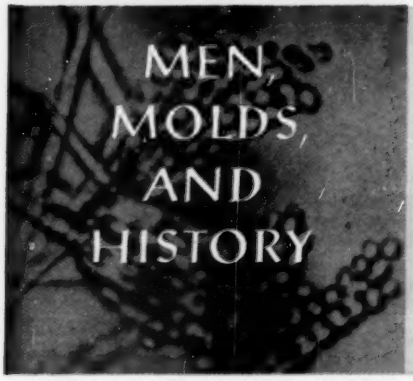

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A Present Concept of Blood Coagulation

A. S. Douglas, B.Sc., M.D., F.R.F.P.S.G., F.R.C.P.E., M.R.C.P.

SENIOR LECTURER IN MEDICINE, UNIVERSITY DEPARTMENT OF MEDICINE, ROYAL INFIRMARY GLASGOW, SCOTLAND

In the mechanism of hemostasis there are probably two main components, the vascular and the biochemical. The vascular component has received only very limited attention in recent years, as compared with the energy that has been expended in elucidating the reactions involved in fibrin formation. This is not because of any failure of appreciation of the importance of the vascular component, but because the coagulation component has been relatively simpler to investigate.

It is useful to express a working hypothesis of the stages involved in physiological hemostasis. On injury to a vessel there is an immediate, but temporary reflex vasoconstriction, and in some manner as yet poorly understood, platelets collect at the site of injury and agglutinate. During this process of agglutination, the vasoconstrictor substance serotonin or 5-hydroxytryptamine is probably released from the platelets, producing moderately prolonged vasoconstriction of the vessels in the area of injury. The initial hemostatic effect produced by vasoconstriction is followed by the formation of a fibrin clot, which effectively seals the vessel. At a later stage this fibrin deposit is removed and fibrous tissue takes its place in the completion of the repair.

This present account is concerned with the development of our knowledge on that phase of hemostasis that results in fibrin formation. There are many investigators who have tried to unravel the chemical and physical mechanisms responsible for the sudden change in the condition of the blood from a sol to a gel when coagulation occurs, and this subject has been studied with great enthusiasm during the last 15 to 20 years. In consequence of this great activity, there have been many theories postulated to explain the changes resulting in fibrin formation; these cross and overlap and abound with a terminology peculiar to any one group of workers in the field, making it difficult for those who have not made a particular study of the subject to disentangle the same experimental phenomenon with different designations.

During the five years from 1952 to 1957 the whole subject was in a state of great turbulence with one interesting discovery following rapidly on another. It would

seem that, at least for the present, the subject has entered a period of relative calm. The various investigators have arrived at some measure of agreement, and for this reason it would seem that this is an opportune time to review the subject.

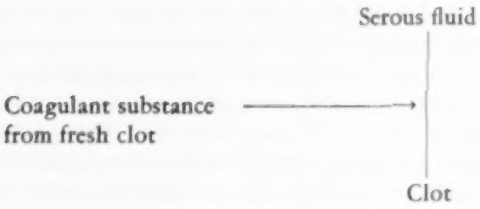
This account is intended for the reader with no particular research interest in these problems. For this reason, this is necessarily a brief account of our present concepts of the theory of fibrin formation and it has been necessary to develop the theme in the main along one particular avenue of thought. In so doing the author is aware that he may well be ignoring experimental findings that, with the progress of further work in the field, may prove to be of major importance. The present stage of relative tranquility in this field has probably been reached because the currently available techniques have been used to their limit of usefulness. Further progress is likely to come from the introduction of some new and more fundamental method of study.

An historical account of the progression of knowledge on this subject is helpful in the understanding of it, and such a chronological account can usefully be divided into three eras by the so-called "classical theory" of Morawitz[1] propounded in 1904. This particular concept of blood clotting had the meritorious record of remaining without serious challenge for almost 40 years. In comparison with the short life of theories during the last 20 years, this was an outstanding achievement. The development of our present knowledge can usefully be divided into the following periods: before the classical theory—preclassical era (prior to 1904); the era of the classical theory—classical era (1904–1943); after the classical theory—postclassical era (1943–1960).

PRECLASSICAL ERA (PRIOR TO 1904)

It is sometimes said that Aristotle was one of the first to ascribe the coagulation of blood to the presence of fibrous material. Malpighi[2] in 1666 described the thread-like nature of the material making up the clot (hence the term "fibrin"), and Willis in 1659 recognized that serum could be separated from the main part of the coagulum.[4] Hewson[5] (1771) was the first to observe that the noncellular elements of the blood played a vital role in coagulation. Using blood with a rapid red cell sedimentation, he skimmed off the plasma before coagulation had appeared and demonstrated that fibrin formation occurred in the plasma. He made a similar observation by entrapping blood between two ligatures on a vein, and when the cellular elements had sedimented he selectively withdrew the plasma, which then clotted. He demonstrated in this experiment that vascular endothelium was remarkable in being able to maintain blood in a fluid state. More details of the earlier history of research in blood clotting were given by Gamgee,[6] Howell,[7] Biggs and Macfarlane,[8] and Robb-Smith.[4]

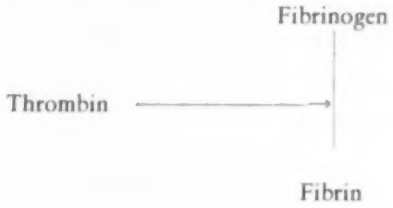
THROMBIN. The first of the factors concerned in blood coagulation was discovered by Buchanan.[9] He found that the washings from a freshly formed clot would coagulate serous fluid (hydrocele or ascitic fluid). Freshly formed serum also possessed this activity. He postulated that the active substance in the washings from the clot was responsible for the appearance of fibrin, from a soluble precursor in the plasma. Buchanan's observations could be recorded as follows:



Schmidt[10–12] confirmed the earlier findings of Buchanan and used the term "fibrin ferment" or "thrombin" in reference to the coagulant activity present in the fresh serum or in the washings from fresh clot.

The term "thrombin" is still used in our modern theory of blood coagulation.

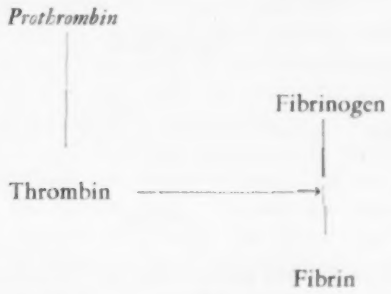
FIBRINOGEN. Denis[13] prepared a fraction of plasma that precipitated when he added a saturated solution of sodium chloride to whole plasma. This precipitate went readily into solution and revealed spontaneous coagulation. This suggested that there was a soluble precursor of fibrin in plasma to which the name "fibrinogen" was given. Hammersten[14] developed methods of preparation of fibrinogen of relative purity. The availability of these preparations of fibrinogen was an important advance, because this was an essential tool for further progress. Schmidt's method involved fractionation by the addition of sodium chloride and freeing this fibrinogen preparation, as far as the technique permitted, from other plasma proteins by repeated precipitations. Schmidt demonstrated that these solutions of fibrinogen could be clotted by the action of thrombin.



In the modern numerical system of nomenclature of blood clotting factors, fibrinogen is factor I.*

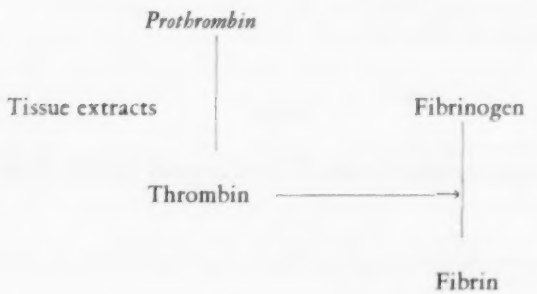
* There is an international committee on clotting factor nomenclature and the numbers are those used by this organization (Brit. M. J. *1*:1292, 1959).

Prothrombin. Schmidt made preparations of thrombin by alcohol precipitation of fresh serum, but the application of the same technique to plasma did not produce any thrombin. He postulated that thrombin must arise from an inactive precursor in the plasma in response to injury, since there was no thrombin activity demonstrable in the circulating blood. The postulated inactive precursor of thrombin was called "prothrombin"; on original description this clotting factor was indeed merely a postulated component, but unlike many subsequent suggested clotting factors, prothrombin has stood the test of time and is now accepted as a real entity, on the basis of much irrefutable experimental evidence. The theory of blood coagulation had therefore to be expanded to include prothrombin.



Prothrombin is factor II.

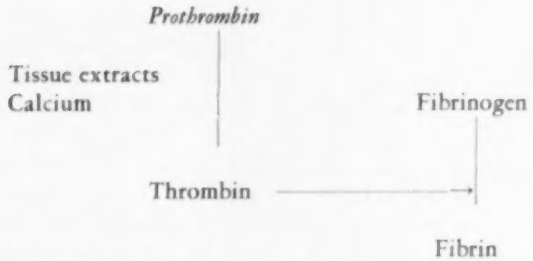
Tissue Extracts. As described previously, Buchanan was able to demonstrate that the freshly formed blood clot contained an agent capable of coagulating hydrocele fluid; he believed that this activity was derived from white cells and, for this reason, went on to test the coagulant activity of tissue. It is now appreciated that the coagulant activity of fresh clot is not in any way derived from the white cells but is due to the presence of thrombin. Macerated tissues were found indeed to have an accelerating activity on blood coagulation but the nature of this was quite different from that in fresh clot. When a fibrinogen solution is added to a fresh clot, this coagulates immediately. The addition of the same solution to macerated tissue does not cause coagulation. When, however, a clean venipuncture is performed and half the blood collected is added to a tube with some contained tissue extract and half is added to a plain tube, the blood in the tissue extract tube clots in a few seconds,



whereas it will take several minutes for the blood in the plain tube to coagulate. Tissue extracts were found to be capable of promoting blood clotting, but in a way quite different from the thrombin effect. Tissue extracts were thought to be capable of accelerating the conversion of prothrombin to thrombin.

Tissue extract is factor III.

Calcium. In 1890 Arthus and Pagès[15] proved that calcium was required for blood coagulation to occur and that substances that bind or remove calcium prevent clotting. Calcium was not essential for the interaction of thrombin and fibrinogen, and it was considered likely therefore to be required for the conversion of prothrombin to thrombin.

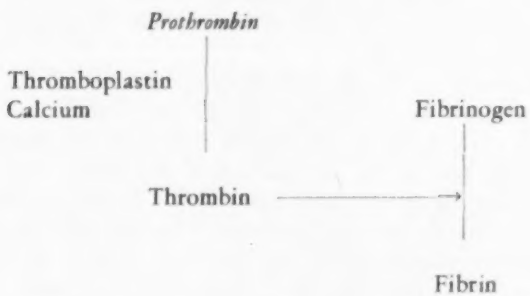


Calcium is factor IV.

CLASSICAL ERA (1904–1943)

Morawitz[1] collected the experimental data available at the turn of the century and postulated his theory, which, as mentioned, stood without serious challenge for almost 40 years. Under the terms of this theory thrombin was said to arise from an inactive precursor prothrombin under the influence of thromboplastin (thrombokinase) and calcium. The thrombin then interacted with fibrinogen to produce fibrin.

Classical Theory of Blood Coagulation



At the time that Morawitz postulated his theory he was using the term "thrombo-

plastin" or "thrombokinase" in reference to the accelerating action of the tissue extracts. It is now appreciated that tissue extract is only one of the components of a complex mechanism needed for the conversion of prothrombin. If, however, we retain the term "thromboplastin" to cover the whole of the mechanism involved in conversion of prothrombin to thrombin, then the theory is still valid. Morawitz appreciated that prothrombin, calcium, and fibrinogen were present in the circulating blood, and he postulated that the intravascular fluidity of blood was due to the absence of active thromboplastic activity. It was believed that, on injury, thromboplastic activity was derived from the wounded tissue or from disintegration of platelets. During the classical era, research was directed to the development of our knowledge of the components of the classical theory.

Prothrombin. At the time of the introduction of the classical theory, prothrombin was a hypothetical substance. In 1914 Bordet and Delange[16] described their early observations on prothrombin. They added to plasma an insoluble inorganic precipitate (calcium phosphate), which was subsequently removed by centrifugation. Whereas, before treatment with the inorganic precipitate, the plasma had clotted in a few seconds on the addition of tissue extract and calcium, after treatment, it would no longer clot with a similar addition. Bordet and Delange were able to elute from the adsorbing calcium phosphate precipitate a substance that, when readded to the adsorbed incoagulable supernatant plasma, would restore coagulation. This experiment established the precedent of much subsequent coagulation research, namely, that clotting can be prevented or delayed by the removal of a factor and the defect corrected by its restoration.

Plasma Fractionation by Adsorption on Inorganic Precipitates. The technique of adsorption of certain plasma clotting components on inorganic precipitates as described by Bordet and Delange[16] has been fundamental to the development of knowledge on this subject. The adsorbing inorganic precipitates now most in use are aluminum hydroxide (alumina) and barium sulfate. This technique of plasma fractionation is very simple and can be applied to plasma or serum. Four clotting components are now known to be adsorbed on these inorganic precipitates, while others are left in the supernatant. Those factors removed on the adsorbing precipitate can be recovered by subsequent elution. In the schematic diagrams shown in this paper, those factors adsorbed on the inorganic precipitates are shown in italics. This technique of adsorption and elution is the basis of the methods of preparation of prothrombin for use in experimental study.

The Distinction Between Extrinsic (or Tissue) Thromboplastin and Intrinsic (or Blood) Thromboplastin. As the classical theory was expressed, the rapid conversion of prothrombin to thrombin was effected by thromboplastin activity in the presence of calcium. It was known at the time of the introduction of this theory that tissue extract was capable of accelerating prothrombin conversion. As will be described presently, it is not the tissue extract alone that is responsible for this rapid conversion of prothrombin, but the thromboplastin system that has tissue as one of its essential components is referred to as the extrinsic (or tissue) thromboplastin system. It was appreciated during the classical era that blood collected into a glass tube without tissue contamination did indeed clot (considerably more slowly than in the presence

of tissue extract) and that there must be resident within the blood itself a thromboplastin mechanism, the intrinsic (or blood) thromboplastin. During the years of the classical era only very scant attention was paid to the blood thromboplastin, because it was thought that the long clotting time of whole blood was a manifestation of the weakness and insignificance of this system. In the simple experiment described previously, when blood is obtained by clean venipuncture and delivered in part to an empty glass tube and in part to a glass tube containing tissue extract, the former clots in 10 minutes whereas the latter may clot in 10 seconds. In the plain tube the intrinsic system is operating, whereas in the tissue extract tube it is the extrinsic mechanism.

Extrinsic Thromboplastin During the Classical Era. On the basis of the classical theory with tissue extract as the source of thromboplastin, Quick[17] in 1935 introduced his well-known and valuable test, the one-stage "prothrombin" test, which was designed on the basis of the classical theory. It was considered that the addition to plasma of an excess of tissue extract and calcium would leave only one limiting factor, prothrombin, which would therefore be measured. For this to be correct it had to be assumed that the rate of thrombin formation depended only on the concentration of prothrombin present. It is now appreciated that the rate of thrombin formation in this test is dependent on factors other than prothrombin. Other recently recognized plasma factors are much more concerned with the rate of prothrombin conversion than is the concentration of prothrombin. Nevertheless this test has been one of the most valuable techniques available for the elucidation of problems of blood clotting and is still the most commonly used method for the control of anticoagulant therapy with coumarin drugs. A prolonged clotting time on the one-stage test is still commonly referred to as "hypoprothrombinemia," though it is appreciated that the defect is often more complex than merely a deficiency of prothrombin. The tissue extracts in common use are saline or acetone extracts of rabbit or human brain or lung. In the description of the technique by Quick,[18] the tissue extract is acetone-dried rabbit brain.

Intrinsic Thromboplastin During the Classical Era. The important developments on blood thromboplastin belong to the postclassical era, but during the classical era there were a small number of valuable contributions.

Thrombocytopenia and Platelets. Morawitz believed that there was thromboplastic activity in platelets. He believed that platelets had a similar type of thromboplastic action to tissue and that this was released from platelets when they came in contact with the wound surface. It is now appreciated that platelets contribute to the formation of blood thromboplastic activity but are not equivalent to tissue extract in this respect. Bordet and Delange[19] in 1912 made valuable studies on the role of platelets; they were able to demonstrate that very little thrombin was formed in serum prepared from plasma freed from platelet; this serum furthermore contained much prothrombin, whereas the clotting of normal platelet-rich plasma results in only trace amounts of prothrombin being left in the serum. It was established therefore that prothrombin consumption was defective when there was a deficiency of platelets. This was an important study, and many of the earlier investigations on the intrinsic or blood thromboplastin mechanism were dependent on the use of this

prothrombin consumption method. When normal blood is collected in a glass tube and this is incubated at 37 C. for an hour, there is no appreciable amount of prothrombin left in the serum at the end of this incubation period. This means that under the conditions of this test, the normal blood thromboplastin system has converted all the prothrombin to thrombin. Where, however, the blood thromboplastin system is functioning inadequately, then prothrombin conversion to thrombin does not occur optimally and the specimen of blood studied shows residual prothrombin to be present. This is the basis of the prothrombin consumption technique. Defective prothrombin consumption is a nonspecific indication of failure of intrinsic (or blood) thromboplastin formation. This failure of blood thromboplastin formation is usually due to deficiency of a clotting factor, but may be due to an inhibitory influence (e.g. heparin or circulating anticoagulants). Subsequent study of this method has revealed that the deficiency of a thromboplastin component has to be very marked before it can be demonstrated in the unmodified prothrombin consumption technique, i.e., in whole blood maintained in a glass tube at 37 C. for an hour and then studied for its residual content of prothrombin.

The demonstration by Bordet and Delange of defective prothrombin consumption in thrombocytopenia provided good evidence that platelets were required for intrinsic thromboplastin.

Hemophilia and Antihemophilic Globulin. Hopff[20] introduced the term "hemophilia," and Ancell[21] described it as an inherited condition affecting the male members of a family but capable of transmission by the female members. Wardrop[22] in 1835 considered the disease as due to defective clotting of the blood. It was Addis[23, 24] who made the important contribution that the abnormality was the deficiency of a plasma clotting factor. A 20 per cent addition of normal plasma restored the clotting time of hemophilic plasma. He demonstrated that a fraction of plasma rich in globulins made by acid precipitation was able to correct the hemophilic defect. It was later shown that platelet-free plasma made by high speed centrifugation was as powerful as the platelet-rich plasma in correcting the abnormality in hemophilic plasma. This established that the abnormality was resident in the plasma and not in the platelets. Brinkhous[25] established that hemophilia was an abnormality of intrinsic (or blood) thromboplastin by demonstrating defective prothrombin consumption. Since the missing plasma component is in high concentration in fractions of plasma rich in globulins, the missing component has been called antihemophilic globulin.

Since thrombocytopenia and hemophilia are both characterized by the inability to convert prothrombin to thrombin at optimal speed, then platelets and antihemophilic globulin were likely to be essential components of blood thromboplastin.

POSTCLASSICAL ERA (1943–1960)

Extrinsic Thromboplastin During the Postclassical Era. The dissolution of the classical theory came from renewed interest in the one-stage "prothrombin" test. It was appreciated that the prolongation of the clotting time on this test was not necessarily due to a deficiency of prothrombin, the precursor of thrombin, but could be

caused by deficiencies of three other plasma coagulation factors, factors V, VII, and X. It is now realized that these three factors interact with tissue to produce a principle capable of the conversion of prothrombin to thrombin; this prothrombin-converting principle is the extrinsic (or tissue) thromboplastin.

Factor V. This factor was discovered as the consequence of study of a case of hemorrhagic disease, which had a prolonged one-stage prothrombin time using Quick's test.[26] Owren[26] found that normal plasma from which the prothrombin had been removed on an inorganic precipitate was capable, in small additions in vitro, of restoring to normal the one-stage prothrombin time of his patient's plasma. Since prothrombin had been removed on the adsorbing inorganic precipitate, such adsorbed plasma containing no prothrombin must therefore have contained a coagulation factor, needed in addition to tissue extract for the conversion of prothrombin to thrombin at maximal speed. This new clotting factor was called "factor V" and was so named because the previously recognized components were numbered as follows: fibrinogen (factor I), prothrombin (factor II), tissue extract (factor III), calcium (factor IV).

As was described previously, prothrombin can be prepared by adsorption on an inorganic precipitate followed by elution. When brain and calcium are added to this prothrombin solution, it will not produce thrombin at optimal speed unless a source of factor V is present. Factor V is believed probably to be synonymous with coagulation components described by other workers (see table I).

Factor VI. This term is no longer used. It was introduced to explain certain experimental phenomena, which can probably now be adequately explained without having to postulate a further factor.

Factor VII. After the administration of the coumarin drugs, there is a prolonged one-stage prothrombin time. Study of such plasma reveals that there is no deficiency of factor V, and one might have expected this prolongation to be due solely to a deficiency of prothrombin. If, however, a tenth part of normal serum is added to the coumarin plasma, there is marked shortening of the one stage prothrombin time. This normal serum has been prepared by standing normal clotted blood in a water bath for one hour at 37 C.; such serum has been found to be deficient in prothrombin and factor V, both of which are almost completely used up during normal clotting.[27] From this it became evident that normal serum was contributing a clotting factor missing in coumarin plasma, which was not prothrombin nor factor V. This property of normal serum has been called its "factor VII activity," the term used by Koller and his associates.[28] This factor has been described by a number of other investigators, and the terms attached to it are listed in table I. Factor VII is usually studied in serum and is often referred to as occurring in serum. There is no reason to believe, however, that it does not occur in plasma, but it is usually studied in serum because there it occurs naturally freed from prothrombin, which is used up during clotting. Like prothrombin, factor VII is adsorbed on inorganic precipitates, and therefore the natural separation during clotting is the only easy way of preparing factor VII freed from prothrombin. Preparations of prothrombin made from plasma by adsorption on inorganic precipitates and elution unavoidably contain much factor VII. A preparation of prothrombin apparently free from factors V and VII

TABLE I

Synonyms of Blood Clotting Factors

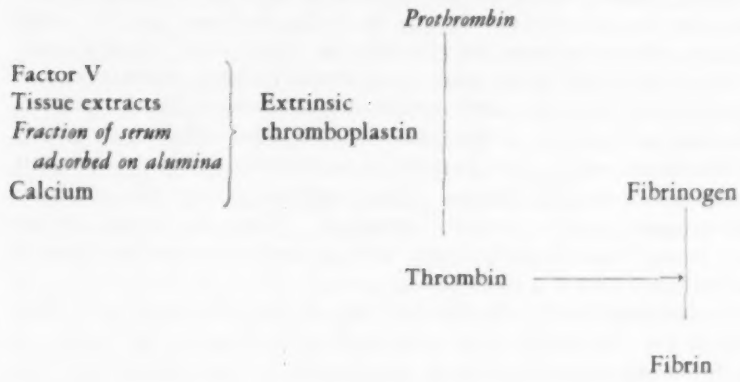
Factor I	=	Fibrinogen
Factor II	=	Prothrombin
Factor III	=	Tissue extract
Factor IV	=	Calcium
Factor V	=	Proaccelerin and accelerin[51] Accelerator of prothrombin conversion[53] Plasma accelerator globulin[54]
Factor VII	=	Serum prothrombin conversion accelerator[56] Prothrombin conversion accelerator[56] Proconvertin and convertin[51] Cothromboplastin[57] Stable component[58] Autoprothrombin I[59]
Factor VIII	=	Antihemophilic globulin Antihemophilic factor[60]
Factor IX	=	Plasma thromboplastin component[24] Plasma thromboplastin factor B deficiency[28] Platelets cofactor II[61] Autoprothrombin II[62] Beta-prothromboplastin[63] Christmas factor[27]
Factor X	=	Stuart factor[29] Prower factor[30] Stuart-Prower factor.

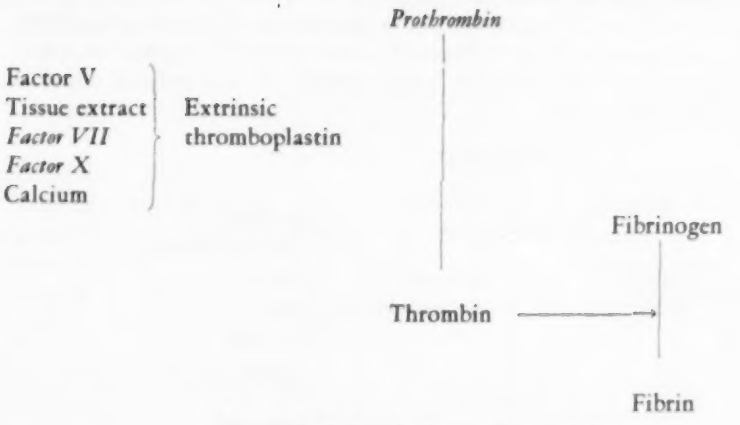
The clotting factors shown here are probably synonymous but there is not complete agreement among all the investigators on this point.

has been reported by Koller and his associates.[28] This cannot be activated at optimal speed unless factors V and VII are both present. Though factor VII was discovered by the study of the coumarin defect, a genetic deficiency of this factor was found subsequently. Reduced concentration of factor VII is also a facet of the defect in vitamin K deficiency and hemorrhagic disease of the newborn infant.

Factor X (Stuart Factor). This is a further clotting factor required in the formation of extrinsic thromboplastin. It was discovered by Hougie et al[29] as a consequence of the study of a case of genetically determined hemorrhagic disease with a prolonged one-stage test. The plasma from their patient was mutually corrective in the one-stage technique with factor V-deficient plasma and with factor VII-deficient plasma. Factor X is not consumed during clotting and is present therefore in the serum. It is adsorbed by inorganic precipitates and is rendered

deficient by giving coumarin drugs. It is also depressed in concentration in vitamin K deficiency. Since the appreciation of factor X, it is realized that the correcting effect in the one-stage prothrombin test of normal serum added to coumarin plasma is due to the presence in the serum not only of factor VII but also of factor X. Like factor VII, factor X is usually studied in serum where it is naturally separated from prothrombin, but there is no reason to suppose that it is not present also in the plasma. The biochemical separation of factor VII from factor X is difficult. The probable synonyms are shown in table I. The Prower defect is probably identical.[30]





Factors adsorbed on alumina are shown in italics.

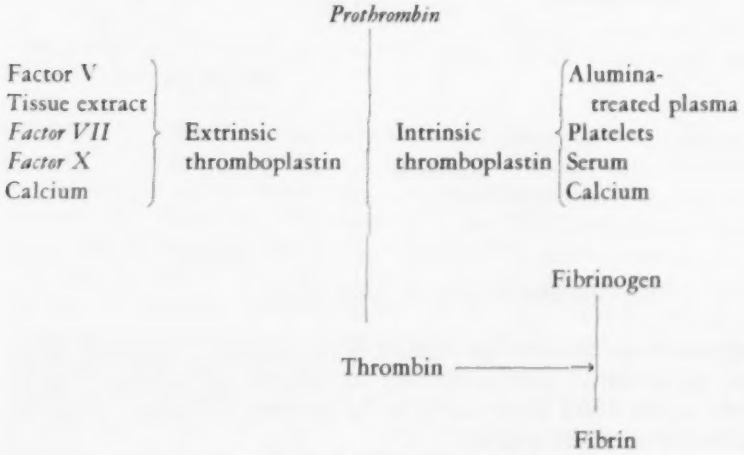
Factors V, VII, and X are therefore all required in the extrinsic or tissue thromboplastin system, but when we come to describe the intrinsic mechanism it will be found that only factors V and X are needed in the intrinsic mechanism, factor VII not being required in the blood system.

Intrinsic Thromboplastin During the Postclassical Era. In the earlier years of the post-

classical era the main interest was in the tissue thromboplastin system. During the last 10 years, however, there has been intense interest in the blood thromboplastin.

As has been described previously, when blood is collected by clean venipuncture and part is delivered to a plain tube and part is delivered to a tube containing some tissue extract, the blood in the plain tube may take 10 minutes to clot, whereas in the tissue extract tube it coagulates in 10 seconds. Because the blood mechanism was so slow in clotting the blood, it was assumed that the system was very weak in comparison to that using tissue. It may have been this impression that diverted attention for so long from the blood system. It was demonstrated by Macfarlane and Biggs[31] in 1953 that this delay in the clotting of whole blood was not due to the weakness of intrinsic thromboplastin but to a delay in its formation. Once formed, it was found to be as powerful as the tissue mechanism. Another observation that directed attention away from the tissue mechanism and toward blood thromboplastin was the finding that tissue extract prepared from a hemophilic person who had died from his disease was at least as powerful as normal tissue in its ability to clot both normal and hemophilic plasma. This suggested that an efficient tissue thromboplastin is inadequate for normal hemostasis. There are reasons for believing that an intact blood thromboplastin with an inadequate extrinsic system also results in faulty hemostasis.

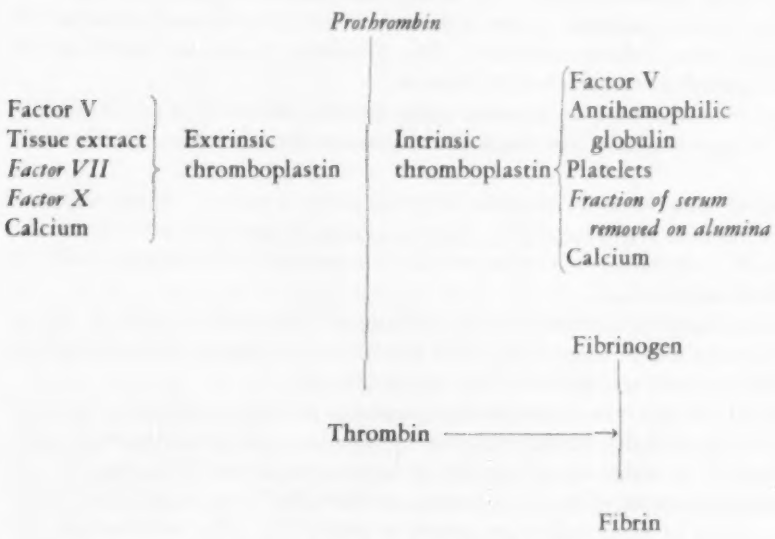
It had been established during the classical era, as described previously, that thrombocytopenia and hemophilia were associated with defective utilization of prothrombin. It was appreciated, therefore, at the start of recent interest in blood thromboplastin formation that antihemophilic globulin and platelets were likely to be required. When supernatant normal plasma after adsorption with alumina is used as a source of antihemophilic globulin and is incubated in the presence of calcium with a platelet suspension made by differential centrifugation of plasma, no appreciable thromboplastic activity, however, can be found. It was realized therefore that such a system is incomplete.



Factors adsorbed on alumina are shown in italics.

The components of blood thromboplastin are contained in a mixture containing adsorbed normal plasma, normal serum, platelets, and calcium. If normal serum is added to the incubation mixture containing adsorbed normal plasma, platelets, and calcium, then a very powerful thromboplastin develops. This prothrombin-converting principle is unstable and the maximal activity is reached and disappears within a few minutes. This blood thromboplastin is at least as powerful as that which can be developed from the use of tissue. In the same way that no significant thromboplastic activity can be developed from a mixture containing adsorbed plasma, platelets, and calcium, no appreciable activity develops from a mixture containing normal serum, platelets, and calcium. All three of these crude components are needed, adsorbed plasma, platelets, and serum in the presence of calcium.

The alumina-treated plasma does not contain prothrombin, nor factor VII, nor factor X, as these are removed on the adsorbing agent. Normal serum incubated at 37 C. for one hour after clotting contains no prothrombin, no antihemophilic globulin, and no factor V. Since there are no significant amounts of prothrombin in this incubation mixture, the clotting effect cannot be attributed to thrombin. The thromboplastic activity is tested by transferring a small aliquot of the incubation mixture, together with calcium, into platelet-free normal plasma. This property of serum to participate in thromboplastin formation is largely destroyed by adsorbing the serum with an inorganic precipitate. The alumina-treated plasma was known to contain not only antihemophilic globulin but also the factor V discussed previously in relation to the extrinsic thromboplastin system.. Using ammonium sulfate precipitation, the adsorbed normal plasma can be fractionated into factor V and antihemophilic globulin, and it can be shown that both these factors are required for the formation of intrinsic thromboplastin.



Factors adsorbed on alumina are shown in italics.

Discovery of Christmas Disease Among the Hemophilic Population. Until 1952 hemophilia was a well-defined entity. Between 1947 and 1952 a number of investigators reported that samples of blood from certain patients clinically acceptable as hemophilic were mutually corrective in respect to their coagulation defects.[22–26] When the blood of the 2 patients was mixed, the coagulation time of the mixture was normal, whereas individually the clotting times were prolonged. This phenomenon was studied in detail by Biggs and her associates.[27] They described 7 patients with disorders clinically indistinguishable from hemophilia, but the blood from these patients was able to correct the abnormality in the majority of samples of hemophilic blood. These 7 patients were all shown to be suffering from the same disease, and this was called "Christmas disease" from the name of the first patient studied, whose surname happened to be Christmas. The missing component of the coagulation system was called the "Christmas factor."

Comparison of the coagulation mechanism in hemophilia and Christmas disease shows certain superficial similarities. They occur in similar clinical grades of severity—in mild cases of either disease there is a normal whole blood coagulation time, whereas in the severe defects of either the whole blood clotting time is markedly prolonged. Both diseases have demonstrable defective prothrombin consumption provided the degree of the defect is sufficient to show on this technique. There, however, the laboratory similarity ceases. As has been described, a powerful blood thromboplastin can be generated from the incubation together of normal adsorbed plasma, normal serum, platelets, and calcium. This is the basis of the thromboplastin generation technique. In Christmas disease the patient's adsorbed plasma reacts normally when incubated with platelets and normal serum. When the serum from these patients is incubated with normal adsorbed plasma and platelets, there is failure to form thromboplastin. In hemophilia (antihemophilic globulin deficiency), the patient's adsorbed plasma fails to react with platelets and normal serum; the patient's serum behaves normally. The Christmas factor was found in that fraction of normal serum adsorbed by alumina.

Among the "hemophilic" population of my country, deficiency of antihemophilic globulin is approximately five times more common than deficiency of Christmas factor.

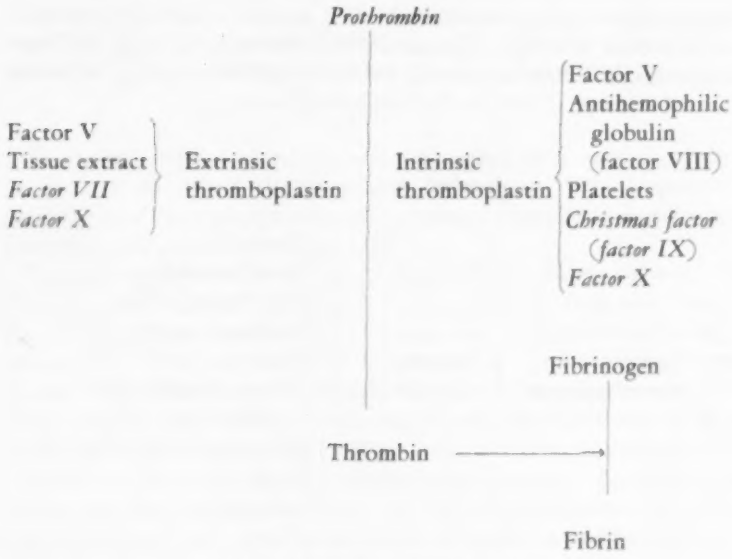
Alternative names for the Christmas factor are given in table I. In the numerical naming, it has been called factor IX. Christmas disease caused by deficiency of this factor has also been called deuterohemophilia,[38] hemophilia II,[39] hemophilia B,[40, 41] hemophiliod state C.[42]

Alternative names for antihemophilic globulin are also given in table I. In the numerical system this is factor VIII. This disease is still usually called hemophilia; other names include hemophilia A[40] and hemophilia I.[39]

Factor VII. It has been shown that the serum of patients with a pure deficiency of factor VII (genetically determined) reacts normally in the thromboplastin generation system.[43] It would seem from this therefore that factor VII is required only in the tissue mechanism. The role of normal serum in the formation of blood thromboplastin cannot be attributed to its content of factor VII. The patients with congenital deficiency of factor VII have, as judged by laboratory testing, no abnormality

in their blood thromboplastin system. Despite the normal blood thromboplastin, these patients have a significant hemorrhagic tendency; it must be concluded that for physiological hemostasis, both the extrinsic and intrinsic systems should be intact.

Factor X (Stuart Factor). This component has already been discussed in relation to the extrinsic or tissue system. In factor VII deficiency there is a prolonged one-stage clotting time, with the serum reacting normally in the thromboplastin generation technique. In factor X deficiency there is a prolonged one-stage clotting time but the serum is defective in the thromboplastin generation technique. The activity of the fraction of normal serum adsorbed on alumina to participate in blood thromboplastin is in part due to its content of factor X. The serum from patients with this rare genetic anomaly is mutually corrective with Christmas disease serum in the thromboplastin generation technique.



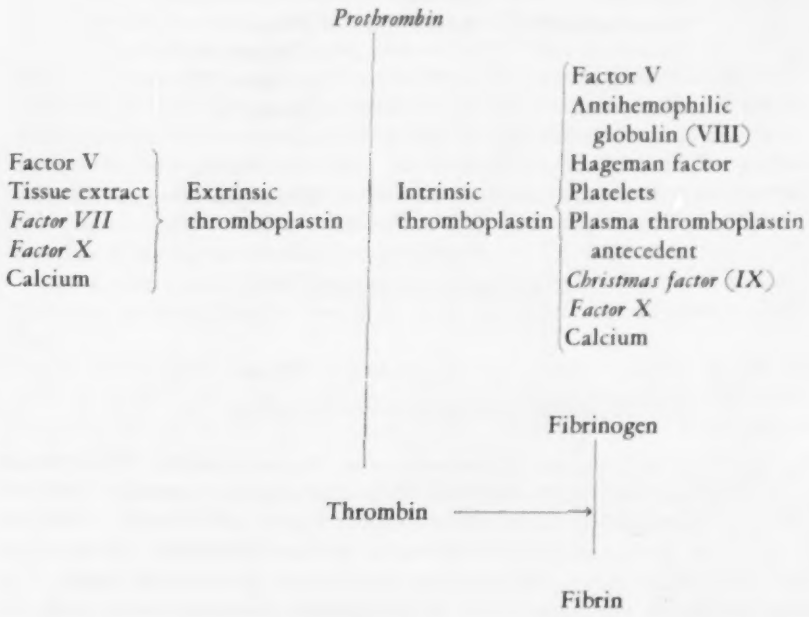
Factors adsorbed on alumina are shown in italics.

Coumarin Therapy, Vitamin K Deficiency and Thromboplastin. The coumarin defect and that resulting from vitamin K deficiency are essentially similar. There are deficiencies of prothrombin, factor VII, Christmas factor, and factor X. The prolonged one-stage prothrombin test is due to the deficiencies of factor VII and factor X and, to a lesser degree, to the moderate depression of prothrombin itself. The abnormal reaction of the serum in the thromboplastin generation technique is due to the deficiencies of Christmas factor and factor X; the evidence indicates, as mentioned previously, that factor VII does not enter this serum blood thromboplastin reaction.

Hageman Factor. Ratnoff and Colopy[44] described a remarkable coagulation dis-

order, which was completely asymptomatic, the condition being discovered when a preoperative check on the whole blood clotting time showed this to be prolonged; these patients, however, can have surgical operations without undue bleeding. They have not only a prolonged whole blood clotting time but also defective prothrombin consumption. In the thromboplastin generation technique the abnormality was most readily demonstrated when both the adsorbed plasma and the serum were derived from the patient. The missing component, called the "Hageman factor" after the name of one of the patients, is not adsorbed by inorganic precipitates and is present in the serum.

Plasma Thromboplastin Antecedent. Soon after the discovery of Christmas disease, it was appreciated that there was a group of cases of constitutional coagulation defects affecting males and females, in which both the adsorbed plasma and the serum were partially defective in forming thromboplastin. The plasma thromboplastin antecedent has properties similar to those of the Hageman factor in its definition by the thromboplastin generation method. It is also not adsorbed by inorganic precipitates and is present in serum. The condition is distinguished from the Hageman factor by obvious differences on clinical definition and by properties of mutual correction in the laboratory.



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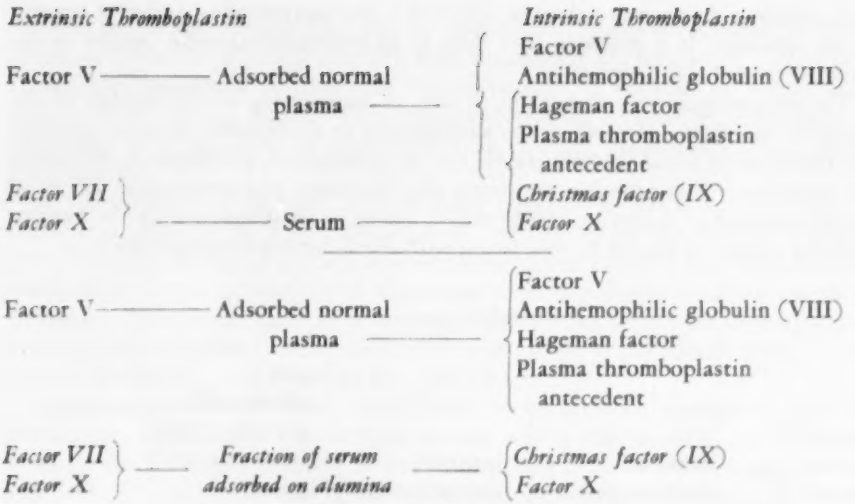
These factors are distributed as follows:



Factors adsorbed on alumina are shown in italics.

PLATELETS. Human platelets contain phospholipids, some of which are likely to be essential for blood thromboplastin formation. The components resolved in platelets have been phosphatidylethanolamine, phosphatidylserine, lecithin, sphingomyelin, and inositol phosphatide.[48]

Relationship Between Extrinsic and Intrinsic Thromboplastin Systems. Deficiencies of antihemophilic globulin, Christmas factor, platelets, Hageman factor, and plasma thromboplastin antecedent all have a normal one-stage prothrombin time. The tissue extract must either contain these components or is capable of circumventing their action. Since injury is inevitably associated with damage to vessels and surrounding tissues and by initiation of blood thromboplastin formation, it is impossible to decide the relative importance of these two systems in physiological hemostasis.

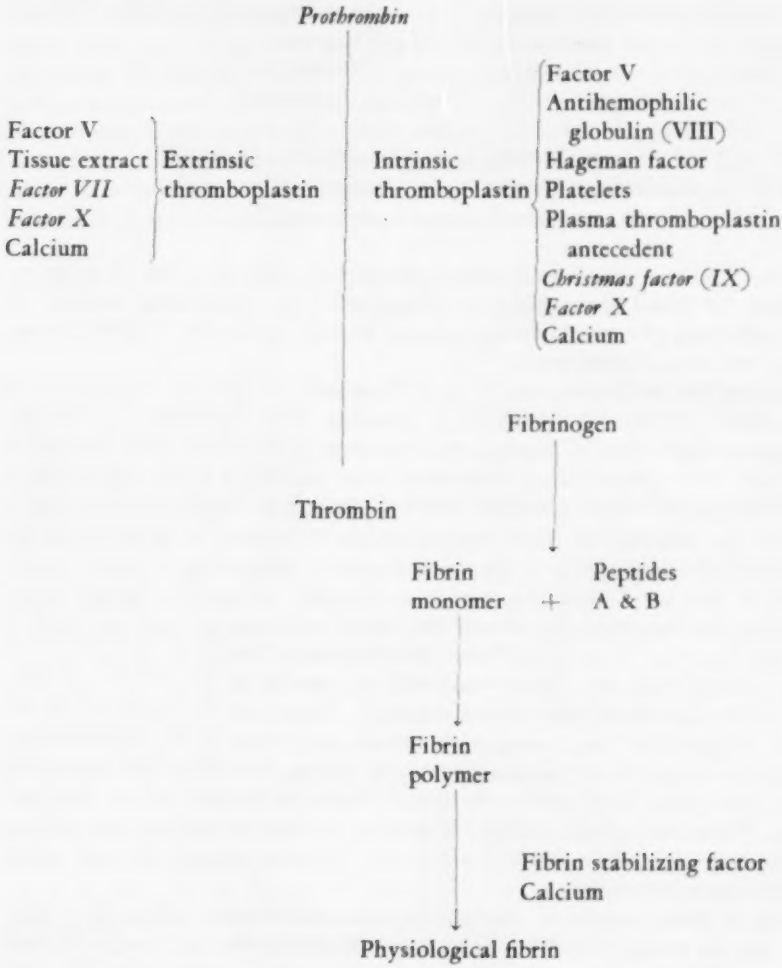
Interactions Involved in Blood Thromboplastin Formation. Because of the difficulties in obtaining pure coagulation factors and the limited techniques of study, our knowledge of the reactions involved in blood thromboplastin formation is very incomplete. It is likely that these factors react with one another in sets of first-, second-, or third-order reactions in some definite sequence. There is evidence that the mechanism is "triggered off" by contact with surfaces other than normal endothelium, resulting in a change in the Hageman factor; the plasma thromboplastin antecedent probably also enters these earlier reactions. Thereafter antihemophilic globulin, Christmas factor, and platelets probably interact to form an intermediate product equivalent to tissue extract, factor V and factor X possibly entering the later stages of thromboplastin formation.

Inhibitors of Blood Coagulation. Normal vascular endothelium, unlike most other surfaces, has the unique property of being unable to initiate the early stages of blood coagulation. This must have an important role in maintaining normal blood fluidity.

There is a powerful antithrombin. This is distinct from heparin, though there is

some evidence that it may indeed be involved in the anticoagulant action of heparin as its cofactor. It is probable that there is an antithromboplastin capable of destroying formed thromboplastin.

The physiological role of heparin, if any, in maintaining normal fluidity of the blood is uncertain. Heparin, when administered in therapeutic amounts, prevents the formation of blood thromboplastin and, in consequence, prothrombin conversion to thrombin. This probably represents the important pharmacological action of heparin though it is also an antithrombin, acting in conjunction with the heparin cofactor present in plasma by interfering with the thrombin-fibrinogen reaction.



Factors adsorbed on alumina are shown in italics.

There are certain diseases that may be complicated by the development of circulating anticoagulants, which interfere with thromboplastin formation. These may complicate hemophilia or Christmas disease possibly in response to the administration of the missing factor. They may develop as an occasional complication of pregnancy or of a variety of connective tissue diseases, particularly diffuse lupus erythematosus.[46]

An enumeration of the inhibitors of blood coagulation would not be complete without mention of the powerful fibrinolytic mechanism for the removal of fibrin. The physiological role of fibrinolysis is also undetermined, but it may make a major contribution in the prevention of significant fibrin deposition in an intravascular situation. Our present concepts of the fibrinolytic system are at least as complicated as those of fibrin formation and are outside of the scope of the present paper. This subject has recently been described in a lucid review.[47]

Fibrinogen Conversion to Fibrin. Fibrin formation occurs when thrombin is added to fibrinogen. Thrombin is a proteolytic enzyme and is able to split arginylglycine bonds of the fibrinogen molecule to form a monomer of fibrin and two peptides, A and B.[47, 48] Polymerization of the fibrin monomer occurs independently of the presence of thrombin to form a fibrin polymer. The physiological fibrin is then formed through the action of another plasma substance, at present not fully defined but described as the fibrin stabilizing factor.[50] This is thought also to require calcium ions.

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Gynecology and Obstetrics in the Old Testament and the Babylonian Talmud*

Part I

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LINDEN, N. J.

"The teaching of God is a tree of life to them that lay hold upon it: and happy is every one that retaineth it."
Prov. 3:18

HISTORIC FACTS

The Talmud represents, next to the Old Testament, the most important work in Hebrew literature. The Bible, and particularly the Pentateuch, contains many laws and precepts, which, according to tradition, were given to the Jews by God on Mount Sinai through the mouth of Moses. This code of laws apparently contained many omissions and misunderstandings, which needed clarification and interpretation; these were compiled in the Mishnah, which first was handed down from one generation to the next by oral tradition. However, after the destruction of the second Temple by Titus in A.D. 70 and the subsequent dispersion of the Jews into a permanent exile, the rabbis, and among them in particular Jehudah ha-Nasi (the Prince), realized that, lacking any written code, all divine ordinances would soon be forgotten. Thus he set out to write down and codify the different laws according to topics and called this Mishnah (repetition, oral study). It is generally believed that its redaction was finished around A.D. 199.

In the following three centuries, a great number of rabbis and scholars undertook to interpret the Mishnah, and the result of the work of these interpreters (Amoraim), which originated in many schools in and outside of Palestine, was the Gemara (memorizing of verbal teaching, tradition). The sum of these two texts forms the Talmud (study, doctrine). That portion that originated during the Babylonian exile has been handed down more completely, and thus we are mostly concerned with the books of the Babylonian and less so of the Palestinian Talmud. The language in which the Talmud is written is a dialect of the Biblical Hebrew, which, however, sufficiently varies from it to be considered a language of its own: Aramaic. It is generally accepted that this is the language that was spoken in Palestine at the time of Jesus of Nazareth.

The Talmud is an encyclopedia that deals with all questions affecting any phase of human life. Its basic form is the dialogue, i.e., discussions that took place among the different rabbis at the various places and schools. Its main substance can be subdivided into two categories: the *halakha* (which deals with the laws and their interpretations) and the *aggada* (consisting of a collection of discussions and anecdotes on history and ethics). The text is so voluminous that it is difficult to find any similar work in the Hebrew or in the non-Hebrew literature; it may best be com-

* This is the first part of a three-part article. The complete bibliography will be given after part III.

pared to the German *Handbuch*, which has become almost a trade-mark in German scientific literature. The Babylonian Talmud is subdivided into six *sedarim* (orders), each *seder* again into *masekhtot* (tractates), of which there are 63. This study will deal only with topics pertaining to gynecology and obstetrics, and it will be attempted to correlate them with the teachings of contemporary medical schools of other countries. The writer does not endeavor to judge the opinions reported by the Talmud measured by present-day knowledge; an impartial report of the teachings of those days without prejudice will be striven after.

The bulk of the pertinent information may be found in the third order, *Nashim* ("Women"), and in the tractate *Niddah* (from the sixth order, *Teharoth* ["Purities"]), which describes the "Uncleanness of Menstruation." Since the available material would be too extensive for one article, it will be presented in three parts. The first will encompass a review of the position of the physician and midwife in antiquity, the anatomy of the female genitals, fertility and sterility, and the talmudists' attitude toward coitus. In the second part we will deal with pregnancy and methods of delivery, while a third installment will contain the statutes pertaining to vaginal bleeding (caused by menses, abortion, or organic condition) as well as the talmudists' opinion on intersexes and sexual aberrations.

MEDICAL ATTENDANTS IN TALMUDIC TIMES

The Physician. In the countries that surrounded ancient Palestine, the profession of medicine was closely linked with religion. In very early times, the art of healing was intimately associated with the deity itself; medicine and sorcery often went hand in hand. The priests uttered certain magic formulas, thus invoking the benevolence of the particular god who had turned away his favor from the afflicted person. The "healers" of the Egyptians, Babylonians, and Assyrians often were magicians who sometimes dispensed the weirdest potions; while the sick person was drinking them, they would chant various formulas of exorcism.

The Biblical physician differed in many respects from his neighboring colleague. The Hebrew word for physician, *rophe*, is first mentioned after the death of Jacob, when Joseph "commands his servants, the physicians, to embalm his father" (Gen. 50:2). It is very questionable, well-nigh improbable, that the "servants" actually were Israelites, for embalming was not part of the Jewish burial service. In this case, as Rabbi Hertz commented, the purpose of embalming was to preserve Jacob's body from disintegration before it reached the family plot of *Mahpelah*, where the patriarch had wished to be buried next to his wife.

Like the Egyptians, the Israelites, in their early history, attributed the healing power solely to God, who had spoken to Moses: "I am the Lord who healeth thee" (Exod. 15:26). Many centuries later, when the Jews had reached the zenith of their culture and civilization under the kings of Judah and Israel, they acknowledged that God had vested the healing power in His high priests, who in turn conferred it on the rabbis. As late as pre-Talmudic times, around 200 B.C., the title "physician" began to be mentioned in connection with nonclerical men. Thus Friedenwald cited a passage from Ben Sira's Ecclesiasticus: "Honor thy physician as it is due him so

that he will respond when you need him" (38:1 *ff.*). This admonition was written at a time when Judea, after having been conquered by Alexander the Great (332 B.C.), had become a Greek province and thus been exposed to Hellenistic influence. That among the Talmudic sages the admiration for physicians has not always been so undivided is proved by a saying attributed to Jehudah ha-Nasi himself: "The best of the physicians is destined to go to *gehinnom* (hell)" (Kid. 82a). It is easy to imagine that such an utterance caused a flood of discussions and interpretations in the post-Talmudic literature when the people wanted to apologize for the *lapsus linguae* of their leader.

The Talmud mentions only a few physicians by name. Preuss pointed out that Minyomin, who was a contemporary of the famous Rabbah Bar Nahmani (about A.D. 280), is known to have established a medical school after the Greek example in Mahoza, Babylonia (Shab. 133b). Both Johanan and Rabbi Abbahu received the eponym *rophe mumhe*, which some translate as "specialist" but which merely indicates an "experienced physician." However, both practiced medicine only as a side line, for in their main occupation, they were merchants. An exception was Samuel ben Abba, who was primarily a physician and who was held in such esteem by his contemporaries that he became the personal physician of Jehudah ha-Nasi. His colleagues later honored him with the title *mar* ("sir"), and his views were frequently sought by the sages when medical problems were involved. An additional occupation of Mar Samuel, who lived from about A.D. 180 to 257 (Graetz) was *yarhinaah* (Bab. Mets. 85b), which can best be translated as astronomer or calendar expert. Besides that, he also was one of the great teachers of the Babylonian era and he later became president of the Academy of Nehardea.

Measured by our standards, all these physicians were general practitioners; specialists in the modern sense were unknown. The Talmud once mentions the term *rophe umman* (Sanh. 91a), which Friedenwald translated as "surgeon"; this is very unlikely, for the term probably means nothing more than "a good physician." Thus, gynecologists or obstetricians were unheard of, particularly since female patients were never examined by male physicians. The *iatrinai* of Galen or the *gynaikaious iatrous* of Soranus were unknown to the Talmudic sages. If a Jewish woman had to be examined, this was done by midwives or other female attendants, who in turn reported their observations to the physician or rabbi, who made the diagnosis and prescribed treatment solely from this description. Mar Samuel once wanted to gain personal knowledge of the anatomical structure of the female breast; the Talmud relates that he "examined it on a slave, whereafter he gave her four zuz 'shame-money', i.e. compensation for the indignity" (Nid. 47a).

The Midwife. The midwife plays an important role in the Old Testament as well as in the Talmud. She is called *meyalledeth*, which is derived from the verb *yalad* ("to bear," "to bring forth"). As will be brought out later, a midwife was in attendance when Rachel and Tamar gave birth. Tamar's midwife must have been possessed of keen diagnostic acumen, since she had predicted the twin pregnancy long before delivery.

Well known are two midwives who lived at the time that Pharaoh commanded that all male infants born to Jewish women be killed; the two women, Shiprah and

Puah, did not heed the order and thus prevented the killing of Moses. Their compassion was rewarded, and the Bible reports: "God dealt well with the midwives . . . and built them houses" (Exod. 1:15–17). Miller concluded from this passage that "this is perhaps the earliest reference in literature to a maternity home," which is improbable when seen in the light of the customs of that era. The exegesis of Rabbi Hertz is much more credible; he interpreted the passage to mean that God built up the midwives' families and increased their prosperity.

In the Mishnah, we find the word *hakhamah* used for midwife; its literal translation is "wise woman," which is equivalent to the French *sage-femme*. The midwife was granted certain privileges denied to the ordinary woman; she was allowed to travel in pursuit of her profession, even on a Sabbath or holiday, which otherwise was considered a sacrilege. When she had attended a delivery, she could be introduced as a witness in court if the question arose of establishing the firstling right (Kid. 74a). The Talmudic judicial code otherwise prohibited women from being admitted as witnesses in court. As to obstetrical procedures, midwives enjoyed a much greater freedom than their modern counterpart; for instance, the Talmud describes a midwife who had introduced her hand into the uterus of a woman with a dead fetus (Hul. 71a). Unfortunately, the text does not explain the purpose of such interference, but one might conjecture that the midwife had been dealing with a case of missed labor and therefore introduced her hand to expedite delivery.

ANATOMY OF FEMALE GENITALS

The Talmudic sages possessed a rather fragmentary knowledge of the human anatomy; this stemmed from two main causes. First, their anatomical knowledge was mainly derived from observation of animals slaughtered either for sacrificial purposes or for food. Second, the dissection of human cadavers and their study as practiced by the Greek and Roman medical schools was contrary to the religious teachings of the Jews, for touching a corpse rendered a person unclean until the evening, and to a priest, it was forbidden altogether. Likewise, a gynecological examination, even if performed by a midwife, was limited to inspection only; digital exploration by an attendant was unknown. This had to be carried out, as will be shown later, by the woman herself and then solely for the purpose of finding out whether she had begun to menstruate and thus had become unclean. Therefore, the anatomical descriptions found in the Talmud may sometimes appear rather naïve to the modern reader; yet, on the other hand, one has to admire the astute judgment of the sages in matters of health despite the meager opportunities for first-hand observation and study.

Contrariwise, their Greek predecessors and contemporaries gave a fairly exact description of the human anatomy since they were not hampered by religious precepts from performing dissections. Soranus of Ephesus (A.D. 98–138), the greatest gynecologist and obstetrician of antiquity (Major), who later in his life emigrated to Rome and practiced medicine under the emperors Trajan and Hadrian, knew so much about the anatomy of the female genitals that many of the names used by him have survived until this day and are still part of our anatomical terminology. Yet

one is surprised to learn how little influence the Greek medical schools of Hippocrates (c. 460 to 370 B.C.) and Herophilus (c. 300 B.C.) had exercised on the thinking of the Talmudic physicians, although the Hellenistic culture has left a definite impression in other fields of science and religion. The Talmud is replete with words taken over from the Greek, which became hebraicized, and many Greek customs found entrance into Jewish daily life. Thus, Judea remained under Greek domination for 150 years until after the death of Antiochus Epiphanes, when Judas Maccabeus, High Priest in Jerusalem, started a rebellion. On the other hand, because medicine had remained so closely linked with religion, the Jews retained their own ideas when it came to treating the sick.

There are several terms to signify the external genitals, e.g. *ervah* ("nakedness"), *herpah* ("shame," "revilement"), "*neboshet*" (which literally means "copper," but which was used already by Ezekiel to signify the pudenda [16:36]). Thus there is no specific word to signify these organs, but the text paraphrases them with symbolic expressions. The phrase "to have illicit sexual intercourse" is circumscribed in the Bible by "to uncover her nakedness" (Lev. 18). The word *beten* is used in a general sense and corresponds to the English "belly," as it is said: "two nations are in thy belly" (Gen. 25:23).

Such vagueness does not apply to the description of the internal organs, for the word *rehem* occurs in the Old Testament and in the Talmud and means "womb" exclusively. Another term for it frequently used is *makor*, which literally means "source"; it signifies "the source of menstruation." One may find the expression *heder* ("chamber") used synonymously with "uterus." In the *masekhta Niddah*, the internal genitals are described in detail and are likened to different parts of a house: "The sages spoke of a woman in metaphor: there is in her a chamber (*heder*), an ante-chamber (*prosdor*), and an upper chamber (*aliyah*). The blood found in the chamber is unclean, that of the upper chamber is clean. If blood is found in the ante-chamber, and there arises a doubt about its character, it is deemed unclean, because it is presumed to have come from the source" (Nid. 17b). In the subsequent rabbinical exegesis, Rabbi Huna is credited with the following interpretation: "The chamber is within, the ante-chamber is without and the upper chamber is built above them, and a duct (*lul*) communicates between the upper chamber and the ante-chamber" (*loc. cit.*).

This portion of the Talmud has given rise to many discussions. The opinions vary according to whether the interpreter is a physician or not. Preuss, a practicing German physician, spent a great part of his life in the study of the Scriptures; thus, he gave an entirely different translation from that of the rabbinic expounders (Goldschmidt [German] and Epstein [Soncino edition]). Both translate *prosdor* as "ante-chamber" or "vagina" (it is mentioned parenthetically that the Hebrew word *prosdor* is derived from the Greek *prothyron*, meaning "veranda" or "vestibule") and *aliyah* as "urinary bladder." *Aliyah* was understood to mean an "upper chamber," a room in the attic; Goldschmidt explained that when a woman is lying down, the urinary bladder is "on top" of the uterus. According to him the canal or duct (*lul*) is nothing else but the urethra. Preuss also stated that *heder* signifies "uterus" but that *aliyah* denotes "vagina" and *prosdor*, "vulva." *Lul* is translated by him as

"vaginal entrance" or "vulva." Finally, to complicate things even further, a third opinion was advanced by Maimonides (A.D. 1135–1204), who was rabbi and Talmudic scholar as well as physician to the viceroy of Egypt. He claimed that *heder* meant "each of the uterine cavities" (Preuss), since he believed that the human uterus was bipartite like that of an animal. *Prosdor*, according to him, meant "neck of the *rehem*," thus "cervix," and *aliyah* signified "the appendages that sit upon the nape of the uterus" (tubes?). In front of them lay the eggs (ovaries). Thus it is almost impossible to have a clear conception of what the true meaning was.

The description of the female genitals by Soranus is by far more accurate. He wrote: "The seminal duct runs from the uterus through each *didymus* (ovary) and extending along the sides of the uterus as far as the bladder, is implanted in its neck. Therefore, the female seed seems not to be drawn upon in generation since it is excreted externally, a subject which we have discussed in a previous work" (Temkin). Galen (A.D. 130–200), who lived and practiced in Rome after having been trained in Pergamum and Alexandria, also gave a description of the female anatomy. He said that there are two glands at the entrance of the vagina (he probably meant Bartholin's glands), but he failed to observe the hymen and the clitoris. He also saw the cervix and the portion that protrudes into the vagina, and he referred to the ovaries as "testicles attached to either horn of the uterus, but made no mention of the fallopian tubes" (Findley).

Whether the existence of the hymen was known to the Talmudic scholars is difficult to ascertain. Whereas Galen did not mention its existence, Soranus emphatically denied it: "For it is a mistake to assume that a thin membrane grows across the vagina, dividing it, and that this membrane causes pain when it bursts in defloration" (Temkin). According to Findley, Soranus' views were not disputed until the sixteenth century and then by Scipio Mercurio, a Dominican monk of Padua (sic!).

Of course, bleeding after defloration was known to the rabbis, who termed it *dam betulim* ("blood of virginity"). The phrase used by the Talmud for defloration is *betulotehen noshrot*, meaning that the virginity "dropped off like a leaf from a tree." According to Rabbi Meir, "the colors of the various kinds of blood are different from one another. In what manner? Menstrual blood is red, the blood of virginity is not so red; menstrual blood is turbid, the blood of virginity is not turbid; menstrual blood issues from the source, the blood of virginity issues from the sides" (Nid. 65b). That a girl may inadvertently lose her virginity is reported in a story from Jerusalem. A family with many daughters is supposed to have lived there and the girls are said to have lost their virginity by taking oversized steps (Shab. 63b).

FERTILITY AND STERILITY

When, a few years ago, an Oriental ruler divorced his wife because she did not bring forth any offspring and he married another woman, many people in Occidental countries were shocked at such cruelty. Yet, in the Orient, fertility of a woman has been considered a *conditio sine qua non* in a marriage ever since the beginning of time. The Talmud regarded it as a divine blessing and sterility was thought to be a curse

and punishment of God for committing of sins. Thus, God's command to Noah: "Be fruitful and multiply and replenish the earth" (Gen. 9:1) has remained one of the categorical imperatives of all religions, for it formed the most important ethnological basis for the preservation of the human race. This is expressed in the Gemara by Rabbi Eleazer: "He who does not engage in propagation of the race is as though he sheds blood" (Yeb. 63b). Therefore, a marriage is concluded mainly for the purpose of procreation; lacking it, the marriage becomes meaningless and the husband is morally compelled to leave the wife. Nevertheless, there is a divergence of opinion on what constitutes fulfillment of the obligation of procreation. "As to the number, the School of Shammai ruled: two boys, whereas the School of Hillel ruled: a boy and a girl, since it is stated in the Scriptures: Male and Female created He them" (Yeb. 61b).

"If a man took a wife and lived with her for ten years and she bore no child, he may not abstain any longer from the duty of propagation, but he must take another wife. If he divorced her, she is permitted to marry another, and the second husband may also live with her no more than ten years" (Yeb. 64a). The Gemara adds that the divorce must be accompanied by the payment of the *ketubba* (financial settlement at a divorce), since it may be the man who is unable to sire an offspring. Guttmacher saw confirmation of this view in a passage from Deuteronomy (7:14): "There shall not be a barren male or female among thee, nor among thy cattle." This attitude greatly differs from that of the non-Jewish Orientals, who considered the woman to be the sole cause of sterility.

Gordon pointed out that the Hebrew word for "sterile," *akar*, is derived from the verb *okar* ("to pluck" or "to root up"); thus the barren woman was thought to be rooted up from the house of Abraham. The Talmud gives a fairly precise definition of the type of woman who is incapable of procreation: "Any woman who is twenty years of age and has not produced two pubic hairs. And even if she produces them afterwards she is deemed to be a woman who is uncapable of procreation in all respects. And these are her characteristics: She has no breasts and suffers pain during copulation. Rabbi Simeon ben Gamaliel said: One who has no mons veneris like other women. Rabbi Simeon ben Eleazar said: One whose voice is deep so that one cannot distinguish whether it is that of a man or woman" (Yeb. 80b). This seems a good description of the eunuchoid type, respectively mixed hypo-ovarian and adrenogenital.

There are many references to sterility problems in the Old Testament. Well known is the story of Sarah, who did not conceive until her old age although Abraham had previously produced a son with Hagar, Sarah's handmaid (Gen. 16:1 *ff.*). The wife of the second patriarch likewise was plagued by childlessness. The Bible relates: "Isaac entreated the Lord for his wife, because she was barren; and the Lord let himself be entreated of him, and Rebekah his wife conceived" (Gen. 25:21). She finally bore Jacob and Esau, but never became pregnant again.

Finally, the third patriarch did not fare any better. While working for his uncle Laban, Jacob fell in love with the youngest daughter, Rachel, but was told that he could not marry her as long as her older sister was unwed. Unwillingly, he married Leah only to find out to his chagrin that she was infertile. "And the Lord saw that

Leah was hated, and He opened her womb; but Rachel was barren" (Gen. 29:31).

How dejected Rachel felt about not being able to give her beloved husband a child can be seen from her heart-rending outcry: "Give me children or else I die" (Gen. 30:1). This clearly expresses the mental anguish and desperation that often drive barren women even to crime. Sterility among the ancients had the stigma of shame attached to it, so that the woman rather wished herself dead than to endure the mockery of her neighbors, a feeling that did not at all apply to the man, as the example of Isaac shows. He married Rebecca rather late in life (about age 40) and it was not until 20 years later that his wife bore the twins.

It is rather difficult to explain why Leah remained barren after having had her first four sons: Reuben, Simeon, Levi, and Judah. After that, "she left off bearing" (Gen. 29:35). Several years went by without her becoming pregnant again, and it might appear that she went through a period of secondary sterility. However, it is more probable that Jacob's love had turned to Rachel and the two handmaids, Bilhah and Zilpah, who bore him the six other children. Later Leah had two more sons and one daughter. Thus, Jacob's potency was not sufficient to satisfy four women, which explains the gap in Leah's productivity between her fourth and fifth sons.

The Scriptures even suggest a certain estrangement between Jacob and Leah, who pondered how she could regain the love of her husband. She sent one of her sons to the wheatfields at the time of the harvest to pick *dudaim* ("mandrakes"), which he brought to his mother. When Jacob came home from the field, Leah gave him some of the mandrakes, with the result that he slept with her that night (Gen. 30:14 *ff.*).

There have been repeated arguments as to the botanical identity of the *dudaim*. Hertz in his commentary translated the word as "love-apples" and described them thus: "The fruit is of the size of a large plum, quite round, yellow and full of soft pulp. The fruit is considered in the East a love-charm" (p. 111). However, the German translation of *dudaim* is *Alraunen* (Goldschmidt), which puts them into the category of roots and not of fruit. They are supposed to be identical with the Greek *mandragoras* from which the English word "mandrake" is derived; mandrakes have been used as aphrodisiacs. The Talmud gives several synonyms for *dudaim*: "Rab called them *yabruhe* (the chaser, because of its ability to expel demons), Levi termed them *sigle* (Cyprus grass), and Rabbi Jonathan called them *sevisak* (which likewise can be translated with mandrake)" (Sanh. 99b). Thus, there is no unanimity as to the kind of plant the Bible meant by *dudaim*, and as Preuss remarked, "the identification is very problematic." Besides the mandrakes, other fruits or remedies were said to have either aphrodisiac or fecundating properties. When Rabbi Johanan was once asked for an effective potion against barrenness, he recommended the following recipe: "The weight of a *zuz* (about 6 Gms.) of Alexandrian gum is brought, a *zuz* weight of liquid alum and a *zuz* weight of garden crocus, and they are powdered together. For a *zabah* (woman afflicted with gonorrhea), a third thereof mixed with wine is efficacious that she shall not become barren" (Shab. 110a).

The Bible abounds in narratives in which unfortunate women poured out their heart before God or His high priest praying for offspring. A well-known example is that of Hannah, who accompanied her husband on his yearly visit to the temple. After

having endured the jeering of Peninnah, her husband's second wife, she petitioned the Lord, who heard her prayer. After many years of a barren marriage, she finally became pregnant and bore a son, the future prophet Samuel (I Sam. 1:6). Another touching story is that of the wife of Manoah in the book of Judges who was unable to conceive; one day she was visited in a dream by an angel of the Lord who foretold that she would have a most unusual son; she then became pregnant and gave birth to Samson (13:24). Finally, there is the story of the prophet Elisha and the Sunnamite woman who had ardently been wishing for a son although her husband was well on in years. Elisha interceded in her behalf, and after a year she had a son (II Kings 4:14). There is a common denominator in all these stories: marital infertility is regarded as an act of God (the text says: "God has closed up her womb"), and therefore, one has to submit to His will, the only recourse consisting of prayer and entreaty.

As Guttmacher has pointed out in his excellent review, "Early Attitudes toward Infertility," the ancient Egyptian papyri recognized sterility as a medical entity; Guttmacher quoted specific treatments of the condition. Although such therapy might appear physiologically unsound measured by the yardstick of modern science, yet the Egyptians felt that sterility was nothing final and unalterable but was amenable to treatment. The early Greek schools, e.g. that of Hippocrates, had recommended measures in the management of barrenness, which foreshadowed modern concepts of endocrinology: the Greeks advocated the ingestion of raw cow's ovaries by those women as an effective treatment.

The antithesis, curse by divine punishment in opposition to disease either congenital or acquired, can be traced through the entire post-biblical and Talmudic literature. The Aggadah tells us of the son of Jehudah ha-Nasi, who after getting married went to a religious college abroad to study for the rabbinate; he returned after 12 years only to find that his wife was unable to conceive because of approaching menopause. Therefore, her father-in-law ardently prayed to God, whereafter she became pregnant (Ket. 62b).

TALMUDIC ATTITUDE TOWARD CONTRACEPTION

The divine command, "Be fruitful and multiply," has become a basic precept (*din*) in Judaism; therefore, it follows by necessity that contraception was forbidden by Mosaic law. However, this command was not a rigid tenet to be kept implicitly, but the Talmud made allowances for several exceptions: "Three categories of women should use a woolen tampon in their marital intercourse: a minor, a pregnant woman and a nursing woman. The minor, because otherwise she might become pregnant, and as a result might die. A pregnant woman, because otherwise she might cause her fetus to degenerate into a '*sandal*' (*fetus papyraceus* or *compressus*). A nursing woman, because otherwise she might have to wean her child prematurely and this would result in his death" (Yeb. 100b). This passage has a number of interesting connotations. According to Rabbi Tam, contraception was not only permitted but required whenever the pregnancy or the ensuing delivery might result in a maternal death. Since a very young gravida might encounter dystocia and thus be in danger

of dying, the Talmudists were opposed to her becoming pregnant. On the other hand, the recommendation of contraceptive measures during pregnancy was inspired by the fear that a superimposed pregnancy (superfetation) may cause the original conceptus to become compressed and flattened (*sandal*). Finally, the purpose of allowing contraception to a nursing mother was to avoid a new pregnancy, which might suppress lactation and thus cause the death of the newborn infant through starvation. It should be noted that the rabbis realized fully that a new pregnancy was possible in spite of lactation.

The previously mentioned potion could, when consumed in a different mixture, have a different effect. The Gemara advises in the same passage: "For jaundice two thirds of the potion mixed with beer is drunk, and the sufferer then becomes impotent" (Shab. 110a). Apparently, a person afflicted with icterus became cured of his illness but, as a side effect, lost his "potency." This result was not limited to men but affected women in a similar way, as shown by a passage from the Tosefta: "A man is not permitted to marry a barren woman, nor one who is too old, nor an *aylonit*,* nor one who is unable to bear children; a woman, however, is permitted to marry even a eunuch. The man is not permitted to drink the 'root-potion' to avoid being fertile; but the woman is permitted to drink the 'root-potion' so that she may become barren" (Tos. Yeb. 8:4). This precept shows that the ancient Jews claimed to have had the solution of a problem that is still under study, as noted by Hartman: an effective, yet harmless, oral contraceptive that is relatively free from undesirable side effects. The Talmud reports an instance where a woman employed the remedy: Judith, the wife of Rabbi Hiyya, after having had a difficult twin delivery, is said to have drunk a "sterilizing potion" in order to prevent further pregnancies (Yeb. 65b). Nothing is told about the results obtained with this potion, but it must have been effective; according to Preuss, it was not the only formula of this type known in those days. Moreover, different standards were applied to men and women: whereas a man had the religious duty (*mitzvah*) of getting married and producing children, a woman was not "commanded to propagate the race" (*loc. cit.*). Moreover, she was also allowed to enter matrimony with a man who by nature was not endowed with any procreative faculties. This included men whose genitals were in some way mutilated, such as those with crushed and squashed testicles or crossected vasa deferentia.

TALMUDIC ATTITUDE TOWARD COITUS

The basic attitude of the Jews toward sex has always been a positive one, from both an ethical and moral as well as a practical point of view: they acknowledged at a very early date of their existence as a people that the sex urge had been created by divine providence. The Talmud tells us in one of the aggadic portions that evil was created on the sixth day, whereafter the world became complete (Löffler). If it were not for the evil desire, according to the Talmud, nobody would build a house,

* An *aylonit* is a woman described as having male features, a beard, and a deep voice, and who is barren (adrenogenital syndrome?) (Yeb. 80b).

get married, beget children, or do business. Sexual desire, if practiced within the boundaries of marriage, was not regarded as anything sinful, but as necessary for the continuation of the race and personal contentment of both partners. Yet, extramarital coitus was strictly prohibited, and premarital chastity was postulated for young men and women alike. In order to spare them the danger of temptation, the Talmud bids them to get married early, a fact that helped to hold down the number of children born out of wedlock. Rabbi Hisda boasted: "The reason that I am superior to my colleagues is that I married at sixteen." Rabbi Huna agreed, saying: "He who is twenty years of age and is not married spends all his days in sin" (Kid. 29b).

These sages realized the tremendous power the sex drive wielded over young people, and therefore, they felt that young men and women could devote much more energy to their work and studies if their sexual needs were satisfied in a natural way rather than through suppression or sublimation.

That prostitution existed, particularly in the larger cities, is mentioned in the Talmud. In Babylonia, its presence was officially recognized by the Code of Hammurabi; in the Old Testament, Tamar is reported to have disguised herself as a harlot to lure her father-in-law into fornication with her (Gen. 38:14–19). The prostitutes would wait at crossroads and accost their prospective patrons. In a later period, the prophet Ezekiel (23) gives a detailed description of the "harlotries committed in Egypt" and in Palestine, which continued although the priests and prophets attempted with all their power at their disposal to stamp them out (Marcuse). The Talmud praised the bachelor who, living in a large city, was able to withstand the daily temptation and keep his body clean (Pes. 113a). Such temptation entered not only laymen but rabbis as well, as shown by a story about two scholars who derived their livelihood from making shoes. "These cobblers lived in the land of Israel and dwelt in a street of harlots. They made shoes for the harlots and went into their houses to deliver the shoes; the harlots looked at them, but the scholars would not lift up their eyes to look back at them" (Pes. 113b).

Onanism or Coitus Interruptus. A well-known passage from Genesis has caused a great deal of comment throughout the centuries as to which act was really implied by the Scriptures. It is reported: "Judah said to Onan: 'Go into thy brother's wife and perform the duty of a husband's brother to her, and raise up seed to thy brother.' And Onan knew that the seed would not be his: and it came to pass when he went into his brother's wife, that he spilled it on the ground, lest he should give seed to his brother" (Gen. 38:8). From the name Onan, the term "onanism" was coined by the Lausanne physician Tissot, who in 1760 wrote a treatise *De l'onanisme ou dissertation physique sur les maladies produites par la masturbation* (Hirschfeld). Ever since, the word "onanism" has meant sexual self-gratification, although the act in reality represents coitus interruptus. The Bible remarks that this act displeased God and that He slew Onan for it; for this reason, the Jewish religion has frowned on both practices. The Talmud refers to masturbation as "blood shedding" because of the utterance of Isaiah, who speaks of "enflaming yourselves with idols under every green tree" (57:5); Isaiah also says, "Your hands are full of blood," which is interpreted by Rabbi Eleazer: "Those who commit harlotry with the hand" (Nid.

13b). Rabbi Tarfon interpreted as follows: "Whosoever puts his hand below his belly that hand should be cut off," (*loc. cit.*) and Rabbi Jehudah ha-Nasi was praised by the sages "because his hand never touched his body below the belt" (Shab. 118b). This strict ruling was taken over by the *Shulhan Arukh*, the code of Jewish law, written by Joseph Caro in 1565 as a digest of Talmudic law; this code prescribes that it is forbidden to the man to hold the penis with his hand while urinating for fear that the manipulation may give him a sexual thrill (Par. 151).

Masturbation was practiced not only by men but by women too, as shown by a saying of Rabbi Nahman: "Tamar exercised friction with her finger; for Rabbi Isaac said: 'All women of the house of Rabbi who exercise friction to destroy their virginity are designated Tamar" (Yeb. 34b). What the rabbis must have thought of King Ahasuerus and his wife, Queen Vashti, who both figured prominently in the book of Esther, is revealed in a passage from the *masekhta* Megillah: "The people say that he masturbated with pumpkins and his wife did it with cucumbers" (12a).

Virginity and Defloration. The topic of defloration takes up a great deal of discussion in the Mishnah as well as in the Gemara. The bridegroom had a perfect right to know whether his future wife was still untouched, and thus a large number of tests are described whereby the groom himself or the rabbis, in case he launched a complaint before a rabbinical court, could either prove or disprove a woman's virginity. The Bible gives the bride's father the recourse to seek arbitration in case his son-in-law brought up trumped-up charges: "I gave my daughter unto this man to wife, and he hateth her; and lo, he has laid wanton charges, saying: I found not in thy daughter the tokens of virginity; and yet these are the tokens of my daughter's virginity. And they shall spread the garment before the elders of the city" (Deut. 22:17 *ff.*). It was within the jurisdiction of the rabbinical court to determine whether the accusation of the bridegroom was justified, in which case the marriage could be annulled, and the bride's father had to take his daughter home again.

Defloration was esteemed a sacred duty of the groom (*be-ilat mitzvah*), which only *he* could execute after the marriage ceremony had been performed. The "*jus primae noctis*," i.e., the right of a priest or a member of the ruling class to deflower a bride, which according to Bloch was common practice among the Egyptians, Greeks, and other peoples within the Roman Empire, was unknown to the Jews. Yet, a remark by Rabba proves beyond any doubt that the sages knew of such practice: "The order was issued that every maiden who gets married on a Wednesday should have the first intercourse with the prefect (*hegemon*)" (Ket. 3b).

The importance that the Talmud attaches to the first coitus is substantiated by the rule that even in case of death in the immediate family of the groom, which would have compelled him to observe the seven days of mourning, the act had to be carried out; during the time of mourning, ordinarily, all work as well as sexual intercourse was forbidden. Nevertheless, after the couple were married, they had to withdraw into a secluded room and perform their sacred duty, whereafter the groom had to separate himself from his bride and observe the mourning (Ket. 4a). The only exceptions to this were on Sabbath eve or the night after Sabbath, when the first intercourse was prohibited.

Premarital Love Affairs. Any premarital sexual activity with a single or married

woman, Jewish or Gentile, was strictly forbidden. Every father was expected to watch over his daughter lest she submit to temptation. Exhorts the Bible: "Do not prostitute thy daughter to cause her to be a harlot; lest the land fall to harlotry, and the land become full of wickedness" (Lev. 19:29). The penalty for illicit intercourse was much lighter in the unwed girl, since, after marriage, adultery was punished by death for both culprits. "If a man be found lying with a woman married to a husband, then they shall both of them die, both the man that lay with the woman and the woman" (Deut. 21:22). In reality, the transgressors were not always put to death; first, according to Talmudic law, capital punishment could be carried out only if the culprit had first been acquainted with the consequence of his crime. And second, it was felt that the ultimate penalty would be imposed by a heavenly court, whereas the earthly tribunal could sentence the man and his paramour only to 40 lashes (Mak. 13a, b).

Marital Duties. The sages had long recognized that in marriage a regulated sex life was indispensable to happiness and productivity. "Only those can study the Torah in purity who are married to a woman," exclaimed Rabbi Hanina (Yoma 72b), a thought that later was repeated in the New Testament. The Apostle Paul exhorts, in his First Letter to the Corinthians: "To avoid fornication, let every man have his own wife, and let every woman have her own husband [7:2] . . . for it is better to marry than to burn" (7:9). The Talmud abounds with rules regulating sex life for both sexes. The average age of marriage was about 15 or 16 years, although a girl became legally eligible at the age of 12 years and one day (Kid. 63b).

For the Jew, marriage has always been a divine institution. Celibacy was unknown in biblical and Talmudic times. Even the High Priests were regarded as human beings with all their faults and frailties, and marriage was just as important to them as to the average Israelite. True, the High Priest had to be more restrictive in choosing a mate than the ordinary man of the street, but he was expected to marry, just as the prophets Samuel, Isaiah, Ezekiel, and Hosea were married. The only Jewish sect that practiced celibacy were the Essenes, of whom Josephus wrote: "They reject pleasures as an evil, but esteem continence, and the conquest over our passions to be a virtue. They neglect wedlock . . . ." (Wars of the Jews, II, 8, 2).

Debitum Conjugale. Since marriage was considered a sacred duty, the *debitum conjugale* was commanded by religious precept and later by the canonic code, and was also adopted by Luther, who advocated twice weekly coitus as healthy. In modern times, marital duty has become part of almost all civil codes and still is considered a basic prerequisite of a happy marriage. The talmudists went even further than this. "Whosoever knows his wife to be a Godfearing woman and does not duly visit her, is called a sinner; for it is said: and thou shalt know that thy tent is in peace" (Yeb. 62b). However, this rule did not apply to everyone, but varied with the occupation of the husband. It applied for instance to wealthy men, whereas laborers were allowed to cohabit with their wives only twice a week. In those occupations that made it necessary for the husband to stay away from home any length of time, the number was still further reduced; for donkey-drivers, who had to go into the villages to buy grain for the market, once a week, and camel-drivers, who went on extended trips, once a month was held satisfactory (Ket. 61b).

Marital duty was binding for husband and wife alike and the wife was expected to submit to coitus as often as her husband requested it. If she refused, this formed a basis for divorce as well as financial indemnity. At the time of marriage the husband had to set aside a certain sum, which served as a fund to take care of the woman in case of his death (*ketubbah*), and he was entitled to deduct seven denars a week from that sum in case of his wife's refusal (Ket. 63a).

It was the practice for harlots to get up shortly after intercourse and perform some type of vigorous exercise, such as jumping or fast walking, to rid themselves of the ejaculate and thus try to prevent a pregnancy. The Talmud puts the "pouring out of the semen" into the same category as coitus interruptus and, therefore, forbids its practice. If a man requested such an immoral act from his wife, she had the right to ask for a divorce and for her entire *ketubbah* as well (Ket. 71b).

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Unwitching the Witches

A Trip to Two Towns in Holland

Joost A. M. Meerloo, M.D.

NEW YORK, N. Y.

One summer I decided to make a pilgrimage to two small Dutch towns, Oudewater and Grave, which have meant so much to the history of rational medical thinking. Since, at the time of my trip, the international atmosphere was so filled with suspicion, prejudice, and political "sorcery," I found it helpful to visit the spots where in olden times liberating ideas were born.

In 1597 the last witch was burned in the Lowlands, but in other parts of Europe the pyres of delusion were still smoldering until the beginning of the nineteenth century. Baschwitz,[1] in his book on the "battle against the devil," estimated that more than a million people were put to death for signing a pact with the devil.

Why is it that in Holland the concepts of mental tolerance and of the tragedy of delusions were born so much earlier? Here, on the delta of three great rivers (the Rhine, the Meuse, and the Scheldt), people of various nationalities and cultural backgrounds met and taught each other different ideas. We know, for instance, that during the Reformation much rebellious literature against old sacred ideas was spread around by the skippers of ships, who, because of their trade and travels, learned to be freer in their thinking.

The art of printing had just been discovered by Johann Gutenberg in Germany and by Laurens Janszoon Coster in Haarlem. Desiderius Erasmus of Rotterdam, though still adhering to the Church, published biting criticisms of the Reformation in his book *In Praise of Folly*. The growth of protests against the Church in the late fifteenth century and sixteenth century aroused more rational thinking about such anxiety-provoking subjects as devils and witches. In the Renaissance was created the idea of a new free, unique man having unlimited curiosity and wanting to be morally responsible to his own conscience only.

Before the physician Johann Weyer published his book *De praestigiis daemonum (On the Delusions of Demons)* in 1563, there were already other signs of rebellion in the country against the persecution of witches.

Already in the beginning of the sixteenth century and until late in the eighteenth century, people from all over Europe were going to the little town of Oudewater on the Ijssel River in southern Holland in order to subject themselves to a weighing test in the official "weighing house." After being tested, they received an official certificate with the seal of the secretary of the town to certify that their official weight was "in accordance with the natural proportions of the body." Nothing was said about their guilt, but those who had been accused of witchcraft were thus absolved from the stigma of having unnatural weight or even of being weightless.

The inhuman persecution for witchcraft became intensified by the infamous papal bull of Innocent VIII in 1483 invoking a sacred war against all those who were incubi and succubi to the devil and his henchmen. The official prosecutors wrote

that terrorizing book, *Malleus maleficarum* (*The Sledgehammer Against the Witches*), which for years was the handbook of those who wanted to burn out man's magic evil of sorcery.

Johann Weyer was born in the year 1515, in the town of Grave on the Meuse River. After studying in Paris he carried on medical practice in his home town and later he settled in Arnheim as the city physician. The last thirty years of his life he was physician in the service of the Duke of Julich and Cleves. He died in 1588. His book *On the Delusions of Demons* was written most probably when he lived in Arnheim. In the book, he wrote that the collective and voluntary self-accusation of older women, through which they exposed themselves to torture and death by their inquisitors, was, in itself, an act inspired by the devil, a trick of demons, a conjuration whose aim it was to doom not only the innocent women and their judges.

Weyer's attempt to understand symptoms in a rational way brought a revolution in medical thought. Weyer was the first medical man to introduce the idea of the "sickness of thinking" that later became the common psychiatric concept of delusion

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in der stede Wage tot Oudewater

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J. Meerloo.

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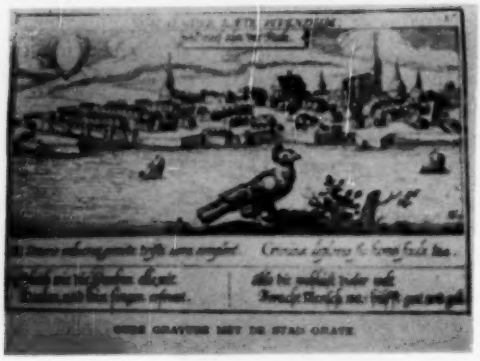

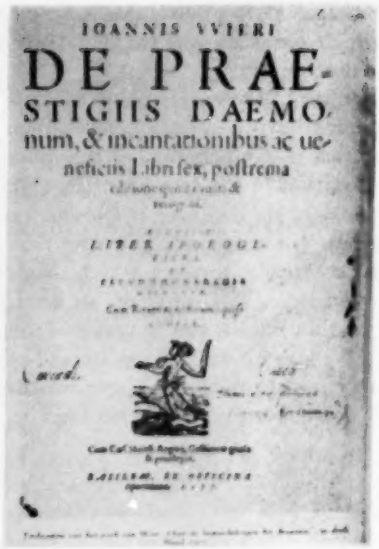

Left, The town of Grave, as it appeared in the days of Johann Weyer.
Right, Title page of Johann Weyer's *De praestigiis daemonum*.

Left, Artist's conception of Johann Weyer, 1576.
Right, Photograph of a witch hanging in the museum of Oudewater.

A street in modern Oudewater.

and mental blindness. Wherever his book had influence, the persecution of witches gradually ceased, in some countries more than 150 years before the persecutional fury was finally brought to an end throughout the civilized world. Weyer's interest in mental diseases and his psychological insights became one of the main instruments for fighting the persecution of witches. He wrote: "It is highly unpleasant to see how people, in order to kill errors, busy themselves killing human beings."

Weyer realized even then that witches were scapegoats for the inner confusion and desperation of their judges and were part of the *Zeitgeist* in general. His ideas came near to the Freudian concept of man's projecting his inner evil onto the scapegoat.

On visiting the two small Dutch towns that were so important in the liberation of medical concepts, one gets quite different impressions. Oudewater still has all the aspects of a once lively town, fully aware of its history. The old "weighing house" is a charming Renaissance museum where every visitor can still get weighed and receive his certificate as a reminder of the ancient release from persecution.

On the other hand, Grave is a sleepy old fortress. That once a great man was born here is not widely known by the population. But the tradition of judging rationally what once was thought of as evil possession by the devil is continued. In the midst of the town stands one of the oldest mental hospitals of the country; patients who are improving find care and hospitality in the homes of private families dedicated to psychiatric after-care.

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The Family of Man*

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In a recent trip around the world, I had the opportunity of meeting, under the distant stars of remote skies, the family of man.

There is no better way of gaining a panoramic view of the family of man than a swift flight around the world, carried by the angels of the winds and the hands of the pilots. The earth and its inhabitants then become a whirling kaleidoscope of races and places, as diverse in appearance as they are alike in essence, as distant from one another in the horizontal dimension of geographical space as they are close to each other in the vertical dimension of historical time.

Perhaps nothing reveals the essential unity that exists in the family of man throughout the world as well as the dinner hour does, when men and women, joined by blood or spirit, gather to break bread and share salt under the same roof. This moment I have shared with diverse peoples of many nations.

I have dined with a Japanese family in Kamakura in the shade of the colossal *Daibutsu*, the ancient bronze statue of Buddha, its huge melancholy head wreathed in shimmering starlight. Squatting on *tatamis* around doll-size tables, I marveled at the swift ballet of my hosts' chopsticks, gracefully picking rice from small snow-white porcelain bowls or a green tendril from the miniature vegetable garden at the bottom of golden broth in red lacquered bowls. I watched their chopsticks selecting savory morsels of *unagi no kabayaki*, which is broiled eel bedded on rice, served in tiny black japanned boxes reminiscent of those used to hold water-color paints. But then, what is a Japanese dinner but a delightful water color, often served in graceful, serene private rooms opening onto those Japanese gardens—rocks, sand, dwarf trees, miniature waterfalls singing in the magic silence—that more than gardens are a shorthand of nature.

I have dined on the shore of Hong Kong's Aberdeen Bay, its waters carpeted with junks and sampans, whose huge mainsails look like the membranous wings of a bat. In this floating village, thousands of Chinese fishermen day after day eat their fare of noodles, abalone, and garrupa in their junks—where they are born, live, and die—by the light of a candle that shines softly, as in heaven a child's soul must shine.

With the Portuguese of Macao I have shared *pomba rostida* and white rice in the dingy taverns of the Rua de Felicidade, amid the clamor of fan-tan players, facing the tiny shops selling gold jewelry, which are dark and dismal cubbyholes in the daytime but become gold-refulgent grottoes like Aladdin's cave at night. Not far from here is Red China's frontier at Portas da Cerco, on the other side of which Chinese soldiers, gun on shoulder and eyes alert, stand waiting.

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* This editorial originally appeared in *MD*, the medical newsmagazine, December, 1960.

I have dined with the Siamese in their *klungs*, or canals, the floating markets of Bangkok, a Venice with sampans, where in huts mounted on stilts dwell the forever-smiling native families, who come down in the morning to pyramid their sampans with golden, amethyst, and coral-toned tropical fruits, meat, and fish. With dainty porcelain spoons we ate tongue-searing hot curries, hotter than the contortions of a Latin rhumba dancer, while nearby, in dazzling ceramic and marble temples, emerald and gold-leafed Buddhas smiled down with millenary wisdom on the Buddhist monks clad in bright saffron-yellow robes.

In the steaming jungle of Cambodia, beneath palm trees throbbing with leaping monkeys, facing what long ago was the center of the fabulous Khmer culture of Angkor Vat, but which today lies almost razed to the ground by the ruthless green invasion of the jungle, I ate with a native family the produce of their swampy rice fields, where little naked boys like tropical fauns, their torsos polished by sweat, piped away on bamboo flutes.

In Beirut, close to the legendary cedars of Lebanon, whose timbers were fashioned into the Queen of Sheba's jewel caskets and with which Solomon's temple was built, I had a meal of *kebbeh* with an Arab family in the shade of the ruins of a medieval castle, overlooking the azure *mare nostrum*, where a thousand years ago out of the horizon came forth the vessels of the Crusaders, their swords gleaming in the sun like restless silver needles.

After seeing the peoples of the world in their native surroundings—Indians, impassive as centuries-old statues; Japanese, diminutive and efficient as a shorthand symbol, whose women are more bird or flower than women; Chinese, with their timeless dignity; Siamese, with their wheatstalk slimness and their eternal smile; Arabs, with their champagne effervescence—after seeing them all, I had the impression that the family of man is one and the same the world over, not only in its biological structure but also in its rituals and customs. The difference between the Parisian drinking his Pernod, the Spaniard his *manzanilla*, the American his cocktail, the Japanese his sake, the Lebanese his *arrack*, or the Quechua his *pisco* is purely a matter of form. For the main thing is not what people eat and drink; the main thing is their desire to dignify this purely biological ritual and raise it above the mere instinctive feeding of beasts. Eating is culture, and culture is eating. Animals *feed*; human beings *eat*. Man tries, with his family or his friends, to provide with his meals not only nourishment for the body but also recreation for the soul.

Whatever happens in any home, whether it be a neat little unpainted wooden domino-box of a house with straw mats and rice-paper windows in Kyoto, a solemn British mansion on Victoria Peak, a bungalow on stilts in Bangkok, or a mud hut on the banks of the Nile, whatever happens—being born, loving, eating, working, resting, dying—is the same the whole world over and reflects the basic unity of mankind. This unity is so well understood by men as individuals, but too often forgotten by nations and their rulers.

It is significant that in times of individual or collective crisis, man turns to his family, seeking there that moral and spiritual support that in normal circumstances is unwittingly taken for granted. At such moments of drama in life, the family suddenly acquires singular worth and prestige, power and dignity. It seems as

though on such occasions the family reverts to the original mission it had in its historical beginning. I refer not to the biological mission of the family, but to its social purpose and function. For the family originated as a human and social unit that dwelled among many other such units but was completely autonomous and existed independently of the whole.

This family unit did not, by the simple addition of other similar units, give rise to the great complex national unit that is the state. Indeed, the state originally was born as an organism inimical to the family unit, a sort of private club of warriors and hunters who set themselves apart from their families to muster their daring and armed strength for hunting wild beasts, waging war, or abducting women. In such a sense, the original state was the enemy of any family that tried to resist it, and vice versa. For the family, in its biological essence, is an isolated conservative unit, dedicated to surviving, just as the state is an organism created for aggression and offense. In every nation in history, the state eventually has ruled over the family, though luckily nowadays in some nations, like the Swiss cantons, the family, through family-type political organizations, rules the government.

The states of the world today still preserve the unconscious memory of their historical origin as a club for sporting, military, or amatory adventures. That is why totalitarian states, aware that the family is their social and spiritual enemy, seek before everything else to destroy it. To this end, the totalitarian state begins by eradicating the three great spiritual forces that preserve the stability of the family: religion, the home considered as a miniature motherland, and the family regard for the father-image, replacing them respectively with the cult of the omnipotent state, acceptance of the nationalistic motherland as man's true home, and the creation of a mythical figure combining the images of God, ruler, and patriarch, usually incarnated in the person of the leader, dictator, or demagogue, who thus replaces the father-image in the home. Nowadays, moreover, the symbolic flame in the hearth that kept the family spirit warm has been displaced by the television screen, through which the aggressive eyes and voice of the political leader penetrate the home and become engraved on the mind of the family.

It is a pleasant surprise to observe the stability of the family in Oriental countries like Japan. In that venerable patriarchy, it is a joy to be a child or an old man, for both enjoy all the privileges and have few duties. To childhood and old age they grant the right to the chrysanthemum of family love; to maturity is entrusted the duty to wield the sword, the pen, the hammer, or the plow. What a contrast this is to the disrupted family life that exists in so many Western countries, as reflected in that serious psychological crisis through which many of our adolescents are passing. The introversion and emotional estrangement that are usually part of this crisis—manifested by the way the adolescent isolates himself with his books, records, and television in his own room, by his slovenliness in dress, and by his rebuffs to family affection—denote a phase of antifamily "schizophrenia," from which fortunately the majority recover.

It is of vast importance nowadays that we physicians do all we can as home counselors to strengthen the family of man, so vital in these critical times. In every human family—from the Holy Family, depicted by Murillo (as shown on the cover

of the December, 1960, issue of *MD*, the medical newsmagazine) as an industrious carpenter, a loving mother, and a healthy golden-fleshed Child, to any other family in the world—there are powerful spiritual forces that are stronger and more enduring than all the atomic energy that man is now harnessing for his own destruction. To strengthen the family is to strengthen the spirit of nations and to make them still stronger by exercising not the sword but the soul.

In Byblos (with Damascus, the oldest town in the world to have been continually inhabited), near the time-darkened ruins of a medieval castle that was conquered during the Crusades by Raymond de Saint-Gilles, Count of Toulouse, I saw a Lebanese family pass by, their humble Arab robes dripping sunshine. The mother, with a child in her arms, rode a plum-colored mule that placidly chewed sun-burnished straws. The father carried a basket of figs and dates and a jug of milk. This living Biblical scene reminded me that down the ages, even mightier than the sword of the Crusaders, whose only remains are the ruins of their castles, has been the example of love left by that other family who, nearly two thousand years ago, at the slow pace of a mule, like the family I was then watching, passed through honey-colored Biblical lands.

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BOOK REVIEWS

The Random House Vest Pocket Dictionary of Synonyms and Antonyms. EDITED BY LAURENCE URDANG. New York, Random House, Inc., 1960. Pp. 310. Price $1.25.

This is a convenient reference work of more than 80,000 synonyms and antonyms of the most common English words. A unique feature of this dictionary is the listing of synonyms in order of frequency of use, as determined by scientific counts. The entries are accurate and up to date.

Because of its small size (3 by 5½ inches), the book is particularly useful as a ready reference dictionary, for any work that does not require a comprehensive thesaurus.

Laurence Urdang, editor of this dictionary, is to be highly commended for his careful choice and arrangement of entries in this valuable work.

The Effect of Pharmacologic Agents on the Nervous System. EDITED BY FRANCIS J. BRACELAND, M.D. Baltimore, The Williams & Wilkins Company, 1959. Pp. 488.

This book comprises the proceedings of the Association for Research in Nervous and Mental Disease, Dec. 13 and 14, 1957. The 26 valuable contributions delineate the status of neuro- and psychopharmacology, the directions in which these are moving, and new areas of interest to clinicians and research workers.

A broad range of subjects is covered, from aims of pharmacotherapy in psychiatry and neurology, to animal experimental evaluation of drug effects on behavior, to clinical studies with phenothiazine derivatives in psychiatry, with a particularly interesting paper being included on placebos.

The papers are uniformly well written and are supplemented by helpful illustrations, tables, and bibliography.

A Psychiatrist's World. The Selected Papers of Karl Menninger, M.D. New York, Viking Press, Inc., 1959. Pp. 960. Price $10.00.

We have spent many engrossing and enlightening hours reading this monument of a book—an intellectual monument it is, indeed, to its author, Karl Menninger. The thousand pages of compact and vibrant prose ring with the wisdom and the wit, the enthusiasm and the erudition, of a great psychiatrist who is also a great man. Together with his father and brother, Dr. Karl Menninger has made of Topeka, Kansas, a mecca for psychiatric pilgrims; he has also made history—living, dynamic history—in his chosen field.

In the 83 articles, addresses, clinical studies and stories, essays, and lectures included in this volume, Karl Menninger shines brilliantly as clinician, educator, organizer, scholar, and historian. But perhaps the most fascinating aspect of the author's multifaceted mind is his own personality, both as a philosopher-theorist of psychiatry and as a human being of noble and great stature. He writes about his family and about life, about his town and about trees, as warmly and clearly as he

does about challenging concepts and theories, like his own on a unitary concept of mental illness. Above all, he is always a man of many ideas and interests, brimming with zest for life and reverence for work.—*Félix Martí-Ibáñez, M.D.*

Edema: Mechanisms and Management: A Hahnemann Symposium on Salt and Water Retention. EDITED BY JOHN H. MOYER, M.D., AND MORTON FUCHS, M.D. Philadelphia and London, W. B. Saunders Company, 1960. Pp. 833.

More than 90 authorities participated in this symposium on the mechanisms and therapy of edema, sponsored by the Hahnemann Medical College, Philadelphia. The papers are all of great interest and value, and the editors, Drs. John H. Moyer and Morton Fuchs of Hahnemann Medical College, have done a fine job of organizing them.

Investigators and clinicians in the specialties of internal medicine, pediatrics, obstetrics, and surgery participated in presenting this comprehensive review of the basic physiology bearing on water and electrolyte distribution, of the pharmacology and clinical use of diuretics, and of the common clinical syndromes manifesting edema as a physical phenomenon. A number of interesting panel discussions delineate the areas of agreement and disagreement among authorities in various phases of the subject of edema.

The book is an excellent contribution to the understanding of current knowledge of edema.

A Short History of Obstetrics and Gynecology. THEODORE CIANFRANI, M.D. Springfield, Ill., Charles C Thomas, 1960. Pp. 449. Price $12.50.

This fascinating history of obstetrics and gynecology is much more than just a listing of names and dates of prominent men in these specialties. On the contrary, it is a broad review of the subject in the light of the history of civilization and of the history of general medicine, and as such, the book successfully shows the development of obstetrics in panoramic perspective.

Particularly interesting are the more than 200 illustrations in the book, including pictures of methods of delivery among primitive peoples, drawings of the fetus by Leonardo da Vinci, a drawing of the famous Maria Tofts giving birth to rabbits. Another interesting feature is the listing of "first occurrences and outstanding events" at the end of each chapter, which conveniently summarize the progress throughout history of various phases of obstetrics and gynecology. Also included is a composite graph showing the total progress of the two specialties in all ages, with the greatest advances occurring in the nineteenth century, as is true of progress in the sciences in general.

The author quotes generously from historical documents pertaining to obstetrics and further enlivens this history by recording obstetrical anecdotes, superstitions, and unusual practices. However, although it is both entertaining and informative, the book is not too well written and should have had more stringent editing and careful proofreading. Nevertheless, it is a fascinating book and well worth reading by everyone interested in medical history.

Symbology: The Use of Symbols in Visual Communication. EDITED BY ELWOOD WHITNEY. New York, Hastings House Publishers, Inc., 1960. Pp. 192. Price $6.95.

The proceedings of the Fourth Visual Communications Conference, which was devoted to clarifying the role of visual symbols in modern life, have now appeared as a handsome, brilliantly illustrated book, under the skillful editorship of Elwood Whitney, who with great brilliancy and imagination also directed the conference.

This book includes many and varied facets of symbology. To mention only a few: "The Challenge of Symbology," by Rudolf Modley, analyzes the need for symbols in industry, technology, traffic, and graphic arts that may be correctly and universally understood; "Hobo Symbology," by James A. Maxwell, studies the fascinating cryptic way in which hoboes tell one another, using graphic symbols, how to live happily and gratis in each community; "Symbology and International Industry," by Dino Olivetti, explaining his company's philosophy in style, design, and making of things; "Symbology on the Highways of the World," by William G. Eliot, 3rd, presenting symbolism on the great roads, their meaning and rationale; "Symbology in Advertising," by Fairfax M. Cone, taking up the good and the bad, the subtle and the obvious, of symbols in promotion; "Symbology Versus Illiteracy," by Frank C. Laubach, considering the creative potential of symbols as a possible basis for a universal language; "Symbology and the Corporate Image," by Domenico Mortellito, considering the artist in industry as a creator of corporate images.

In other articles George Nelson, the designer, "scans the world of images"; Dr. Irving A. Taylor excellently develops the function of visual symbols, the psychological aspects of visual communication as perceptual development, and its various stages, from the "oceanic" or "diffuse sensory world" at birth to the stage of visual integration; the Reverend Marvin P. Halverson delves into symbology in religion throughout history; Frank Stanton makes a plea for a "prompt flow of clear and universally understandable information"; and the Editor-in-Chief of *MD*, the medical newsmagazine, studies symbology in medicine.

But the best symbol in this fascinating book is provided by the photographs of the hands of The Very Reverend Monsignor Walter J. Darcy, praying in sign-language for more and better enlightenment and understanding.—*Félix Martí-Ibáñez, M.D.*

A Doctor Enjoys Sherlock Holmes. EDWARD J. VAN LIERE. New York, Vantage Press, Inc., 1959. Pp. 141. Price $3.00.

What a delight it has been to read through the essays on Mr. H. and Dr. W. included in this slim subtle book, written by the distinguished Dean of the School of Medicine at West Virginia University. An outstanding medical educator and a lucid and euphonic writer, Dr. Van Liere is a devoted scholar on Holmesiana who also feels a sincere solidarity with his famous colleague, Dr. Watson. For years, the author has collected a treasure chest of information about the two immortal friends, and in this book he generously shares his riches with other Holmesian hounds.

The weather—autumnal winds, yellow fogs, rain squalls, and sharp frosts—as studied by Dr. Watson; his observations on brandy and cardiology, physiology and

endocrinology, botany and zoology; the anatomical and chemical knowledge, and the athleticism of Holmes—all of these are presented in charming essays, full of Holmesian lore, and highly revealing of the kind of humor and deep wisdom of the author himself.—*Félix Martí-Ibáñez, M.D.*

New Hope for Your Hair: A Scientific Guide to Healthy Hair for Men, Women and Children. IRWIN I. LUBOWE, M.D. New York, E. P. Dutton & Co., Inc., 1960. Pp. 253. Price $3.95.

This book is a helpful guide for the layman in care and maintenance of healthy hair. In simple, nontechnical language, the author discusses dandruff, baldness, new treatments for regrowth of hair, nutrition of hair and scalp, dyeing the hair, and other phases of the subject.

The author, a New York City dermatologist, has written many articles on diseases of the skin and scalp for medical and popular publications. His book fulfills a need for a nontechnical work on the care, growth, behavior, and loss of hair. The author does not suggest that all baldness can be corrected, but indicates the trend in current research on baldness and advances in its treatment, particularly by use of hormones.

Numerous drawings and illustrations are included, as well as a helpful glossary of medical, scientific, and cosmetic terms relating to the hair and scalp.

The Medical Sourcebook: A Reference Handbook for Legal, Legislative and Administrative Personnel. FRED A. METTLER, PH.D., M.D., SC.D. (HON.). Boston, Little, Brown and Company, 1959. Pp. 1000. Price $25.00.

This excellent sourcebook should be very valuable to lawyers who deal with medicine, to physicians, to newspaper and magazine writers, and to others in allied professions. A wealth of information is provided on anatomy, physiology, and pathology and on traumatic conditions of special interest in legal cases. Physicians who must explain medicine to laymen will be particularly interested in sections on the problems of describing diseases and defining medical terms and in the chapter on methods of obtaining information from medical sources.

The functions and disorders of systems are thoroughly discussed and the regions of the body and the interrelations of structures are carefully examined.

An excellent appendix provides a helpful guide to activities, personnel, publications, and societies in the basic sciences and clinical fields of medicine.

This exceptional book is a major contribution to better communication between physicians and the general public, members of the legal profession, and information media personnel.

The Child with Abdominal Pains. JOHN APLEY, M.D., F.R.C.P. Springfield, Ill., Charles C Thomas, 1959. Pp. 86.

In this study of the child with abdominal pains, the author states that "in most cases an organic cause cannot be found. Moreover, an organic cause cannot explain the other disturbances which are commonly associated with recurrent abdominal pain." He goes on to describe his studies with children, and in many cases, re-

current abdominal pain was relieved after "informal psychotherapy" by the physician, which led to lessening of tension and emotional disturbance. The author believes that sympathetic guidance and reassurance will be more effective than treatment with drugs in most cases.

The first part of the book deals with materials and methods of inquiry, the medical history, pain, organic abnormalities, intelligence and emotional status, treatment. Part 2 is a discussion of the clinical findings with regard to organic and other causes and diagnosis and management of children with abdominal pain.

Books in Brief

The Merchants of Life: An Account of the American Pharmaceutical Industry. TOM MAHONEY. New York, Harper & Brothers, 1959. Pp. 278. Price $3.75.

Included here are the histories of the leading American drug companies and their most important (and lucrative) products. Too many dry facts and figures are cited, and the book, as a result, is a rather dull recital.

Rudolph Matas: A Biography of one of the great pioneers in surgery. ISIDORE COHEN, M.D., WITH HERMANN B. DEUTSCH. Garden City, N. Y., Doubleday & Company, Inc., 1960. Pp. 431. Price $5.95.

This is a warm, inspiring biography of the late Rudolph Matas, "father of modern vascular surgery." The numerous contributions of Matas to medicine are recounted, as well as the story of his personal life, which included much conflict and unhappiness. Isidore Cohn was a pupil, associate, and friend of Matas.

Smoking and Health. ALTON OCHSNER, M.D. New York, Julian Messner, Inc., 1959. Pp. 108. Price $3.00.

This is an indictment against smoking, which links tobacco with cancer and also disorders of the heart, arteries, and digestive system. The author outlines a program to help smokers stop smoking.

Conquest of Age: The Extraordinary Story of Dr. Paul Niehans. GILLES LAMBERT. New York, Rinehart & Company, Inc., 1959. Pp. 220. Price $3.95.

Described in this book are the life and work of Paul Niehans, whose cellular therapy has aroused violent controversy and often strong censure. Niehans' therapy drew international comment after recovery of Pope Pius XII from serious illness in 1954, since which time the treatment has been both denounced as quackery and praised as a guarantee of eternal youth. This book may guide the reader in forming his own judgment of Niehans' theories.

INEXPENSIVE FOOD SUPPLEMENT. An inexpensive protein food supplement, which sells for about a penny a portion, was described at the Fifth International Congress on Nutrition. The supplement, which has won wide acceptance in Central America, contains whole grain maize, 29 per cent; whole ground sorghum grain, 29 per cent; cottonseed flour, 38 per cent; Torula yeast, 3 per cent; calcium carbonate, 1 per cent; 4500 units of added vitamin A per 100 Gm.

DRUG INHALER FOR MIGRAINE. A drug inhaler that can be carried in a pocket or purse was termed "a very useful agent" for relief of migraine headache (A. M. A. Arch. Otol., Sept., 1960). The inhaler allows inhalation of small but effective doses of ergotamine tartrate, which is commonly given by injection to relieve the pain of migraine headaches. Forty-four of 60 patients who used the inhaler obtained complete or partial relief.

IMPROVED SKIN THERMOMETER. A skin thermometer that gives readings in 10 to 15 seconds, can be easily read, and is as portable as a pencil has been introduced by the Cary Thermometer Co., New York City. The instrument is designed for establishing a diagnosis in certain conditions of disturbed circulation or innervation of the extremities or other superficial areas and for the evaluation of treatment.

RADIATION ILLNESS IN BLOND PATIENTS. In a study of 530 women given radiation treatment after surgery for genital carcinoma, it was found that fair-haired patients developed more severe radiation illness than women with brown hair, according to Kurt Fochem (University of Vienna). Symptoms included gastrointestinal disorders, increased blood pressure, and erythema.

DECONTAMINATION OF RADIOACTIVE SUBSTANCES ON SKIN. Skin soiled by radioactive substances has been significantly decontaminated by use of granulated and waterless skin cleansers (a protective lanolin and silicone lotion) (Arch. Environ. Health 1:87, 1960). In tests with 155

persons, granulated skin cleansers gave removal efficiency of 99.6 per cent for P^{32} and 99 per cent for I^{131}. The waterless cleansers were less efficient.

SARCOLYSIN PROLONGS LIFE OF CANCER PATIENTS. Prolonging of life of cancer patients with seminoma of the testicles has been made possible by the use of sarcolysin, in Russia, reported N. N. Blokhin, president of the U.S.S.R. Academy of Medical Sciences, Moscow. The treatment was used in 86 patients who had previously undergone surgery for seminoma of the testicles. Sarcolysin was given in doses of 40 to 50 mg. once in six to seven days, with constant observation of the blood condition. Sarcolysin has not been found to affect other types of testicle tumors.

PREMATURE LABOR. A nonhormonal therapy to prevent the onset of labor in cases where there is thinning or dilation of the cervix is a combination of piperidolate hydrochloride, ascorbic acid, and hesperidin complex (Dactil OB, Lakeside). Like all anticholinergic agents, the drug should be used with caution in patients with glaucoma; no other contraindications are known.

STAPHYLOCOCCIC VACCINE DEVELOPED. A staphylococcic vaccine recently developed has given an excellent response in 44 of 60 patients (J.A.M.A. 174:35, 1960). The 44 patients had a rapid clearing of infection and freedom from reinfection for six months or more. The vaccine was used when antibiotics and other routine treatments failed.

MECHANICAL COMPRESSOR FOR COMPRESSION FIXATION. A mechanical compressor for compression fixation in the treatment of non-union and pseudoarthrosis was described to the International Society of Orthopedic Surgery and Traumatology. Use of the device eliminates the necessity for bone graft and the removal of scar tissue and allows immediate active mobilization.

HYDROCARBON DETECTOR. A portable, battery-powered instrument for detecting acetone, alcohol, and other hydrocarbon gases in concentrations as low as parts/billion utilizes the principle of flame ionization detection. This technique is said to afford greater sensitivity than other methods such as mass spectrometry, infrared, hot wire combustion, and thermal conductivity. The instrument is marketed as FIAD (Flame Ionization Analyzer and Detector) by Carad Corporation, Redwood City, Calif.

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FOREWORD: A New Policy

The objective of the QUARTERLY REVIEW OF OPHTHALMOLOGY is to bring together in one publication a concise record of current happenings, both national and international, in this field. Selection and editing of material are designed to prove informative to *the entire medical profession* as well as to ophthalmologists. Manuscripts for the QUARTERLY REVIEW OF OPHTHALMOLOGY should be submitted to Dr. Arnold S. Breakey, Ophthalmological Foundation, 111 East 59th St., New York, N. Y.

HISTORICAL VIGNETTES. XI.

General Scope and Significance of the History of Ophthalmology

George E. Arrington, Jr., M.D.

RICHMOND, VA.

Those who attempt to divorce any discipline of medical thought from medicine at large run contrary to the best interests of their own special fields and to the best interests of medicine itself. Thus a special field of medicine such as ophthalmology exists in terms of general medical concepts and is indeed medicine. Without preserving ophthalmology simply as a detailed variety of medicine, the specialty is out of touch with itself, so to speak, i.e., with its continuously generating sources, and it rapidly becomes merely applied, static dogma. In such an isolated circumstance, advancement, new ideas, and broader understanding of visual and ocular disturbances become less and less likely. Medicine then has a great unifying factor binding all its detailed aspects (i.e. specialties) into the most imposing intellectual achievement of man—his total active efforts to preserve life and to promote happiness.

The history of ophthalmology is a subject derived from this concept, i.e., it is the search for and the preservation of those productive aspects of this detailed manifestation of medicine, ophthalmology, for the purpose of deriving a clearer view of the present via the past in order to guide us more skillfully into the future. The *raison d'être* of the history of ophthalmology, and this can be extended to medical history generally, is not the thing in itself, as in the case of art. The history of ophthalmology has rather a different importance in that it gives the reader or scholar an awareness of his position in the continuously changing panorama of medical progress. It affords him a frame of reference for his attitudes, his basic medical concepts, his ideas of therapy, his approach to his patient, his profession, and man generally that he cannot gain by any other means. It also brings him into intellectual contact with the greatest thinkers about solutions for both the theoretical and practical problems of ophthalmology. It inspires the best in us by countless good examples of hard work and dedication. It softens our overenthusiasm for novel results and immediate success by revealing how many important concepts grew out of hundreds of rethinkings by many generations of conscientious men, being finally crystallized and expressed by one genius who added the final insight. It warns us through the mistakes of others to avoid their needless repetition. And finally, it is the repository of honor for our great thinkers and their enduring ideas.

Medical history is a part of medicine that must remain, like other special fields of emphasis, within medicine to derive benefit from medicine and dynamically affect

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EDITOR'S NOTE: Dr. Arrington's final vignette on the history of ophthalmology includes a fine list of pertinent references that should form an excellent base line of study for the interested student. These references have been carefully culled from a group of 800 and represent "high points" in the development of ophthalmic science.—A. S. B.

medicine. The study of medical history is *not* an isolated academic exercise. It is *not* a hobby for the amusement of retired practitioners. Its goal is *not* amusement or fun. It is a serious and useful tool in the hands and minds of active physicians.

Believing this, I have presented in previous issues 10 vignettes touching certain high points of achievement in our art and science throughout recorded history. They are intended to engage the interest and to stimulate the curiosity of men who are in ophthalmic practice toward renewing and developing their understanding of the roots of their knowledge. Such a sound basis for thought as history provides cannot but enhance one's practice. Time is at the proverbial premium; part of it cannot be better spent than in enlarging one's knowledge of his subject through the eyes of history. There is always time for what is vital and important to one. The issue is whether one has the sense of values and depth of understanding to realize the importance that a study of the history of his subject has to his professional life. In the past, emphasis on the biographical and anecdotical aspects of medical history have worn so thin and proved to be so useless that many were justifiably prejudiced against it. But today a new era of medicohistorical thought has taken precedence in which the shaping of ideas, concepts, and principles has superseded dry memorization of dates of discovery and circumstances of technical developments.

There is intellectual challenge in the reading of modern presentations of medical history. There is the constant realization of achieving a reliable frame of reference for contemporary thought. Medical history is a *sine qua non* for today's physician, who must selectively equip himself to practice from the overwhelming quantity of data, techniques, and instrumentation that characterize modern medical education. It is essential that he find a source of protecting the integrity of his personal, individual importance in the medical situation that is so essential to continued good medicine. That source is his sense of kinship to the physicians of the recent and remote past with whom he shares his experiences, and these men are to be found in the pages of medical history.

Believing that such intellectual activity in medicine is an excellent hope for its preservation and continued growth, I am presenting here a list of readings in ophthalmological history to tempt my colleagues who have been too timid previously to invade the "sacred halls" of medical history. There is no special prerequisite, and we find that the great thinkers of the past speak much more clearly and eloquently to us than their textbook interpreters. Thus, in reading historical references in some subject that we do not ordinarily find particularly rewarding, we may be inspired anew by the thoughts of its original author.

In reading these writings, we should try to look at ophthalmology through the eyes of the original authors, in terms of their environment and their age. By doing this we gain a new and broader scope of the subject that cannot help but assist us in seeing ophthalmology in greater detail and from a more accomplished viewpoint. Often the results and conclusions of our predecessors will prove to be faulty by modern standards, but we can always learn by considering their expression of a problem and their methods of attacking it.

Each reference is likely to lead one into many diverging paths, some related to the same medical subject and others along more broadly related cultural and historical

lines. We should not be misled into condemning this. It is only to one's benefit, living as we do so closely bound by our professional activities. We should take the chance to move from medieval art and civilization to medieval ophthalmology. To do this enables us to step more eloquently back into present-day ophthalmology.

But whether novice or senior physician, we should not miss the experience of acquiring a historically oriented mind.

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SPECIAL ARTICLE

The Contact Lens Problem

Contact lenses are worn by millions of Americans today. After modest beginnings just a few years ago, contact lenses attained an unprecedented popularity, which is steadily on the rise. The manufacture of contact lenses has grown into a multimillion dollar business and fly-by-night commercial contact lens fitting firms are mushrooming all over the country.

Two types of contact lenses are used to fit most cases. The so-called scleral type, which envelopes practically the whole anterior surface of the eye and is held securely in place by the eyelids, is the older type of contact lens and is used today only in some specific cases where the more modern small lenses will not suffice. The so-called corneal lens, developed in this country about 12 years ago, has been gradually reduced to a small curved disc approximately 9.5 mm. in diameter. This marvel of modern optical engineering, usually made of plastic, incorporates the patient's correct spectacle prescription and is individually fitted to the cornea to ride on a thin film of the lubricating tears always present in healthy eyes.

Vision is better with contact lenses, because there is no limitation to the visual field, as is usually imposed by spectacle frames. Also, the contact lens moves with the eye and carries the sharply focused central area of the lenses into all directions of the gaze. With spectacle lenses, which are fitted in a rigid frame about half an inch away from the cornea, the eyes do not see through the optical center of the glass except when looking straight ahead. This results in distorted vision, which can be corrected only by turning the head to the optical center.

Vision is more natural with contact lenses because the correction occurs for practical purposes at the same site where the actual optical error is; the result is less distortion and less change in image size than with ordinary spectacle correction. Notably, with contact lenses it is now possible to correct eyes that have extremely different optical (refractive) errors, i.e., anisometropia.

Cataract patients are more comfortable with contact lenses because the thick corrective lenses are replaced with invisible small discs worn under the eyelids. As just noted, the visual field and the image size are kept, with contact lenses, within near natural and therefore comfortable limits. It is now possible to correct vision in a patient who had a cataract removed from one eye with a contact lens. In this way the operated and nonoperated eyes can be made to work together, resulting in great comfort for the patient.

Fitting of contact lenses was achieved in the past by taking a mold of the living eye. This involved procedure is no longer necessary, except for the seldom-used scleral type of contact lens. The corneal type of contact lens is fitted by measuring the corneal curvature with an instrument that consists of two lights moving along a known arc in front of the patient's eye. The physician observes the eye through a telescope and when the mires (mirror images) of the lights that move along the arc are touching each other, the physician is able to read from a scale on the arc the actual

curvature of the cornea in that specific meridian. This insturment was first developed by the French ophthalmologist Javal about 75 years ago and was further refined a few years later by the Scandinavian ophthalmologist Schiøtz. Although improved in appearance and tooling, the instrument in the form in which it is used today is essentially unchanged. A number of other factors have to be considered, such as the actual diameter of the cornea, the size of the palpebral vertical opening, the quantity of lubricating tears, and last but not least the general state of health of the eye. Motivation of the patient plays some role but is not as important as some workers in this field seem to believe.

Fitting of contact lenses is a medical problem. The foregoing paragraph probably made it quite clear that many of the factors that have to be clarified before fitting of contact lenses should be considered are strictly in the medical ophthalmological field. By his education, experience, and instrumentarium, the ophthalmologist is eminently qualified to evaluate the state of health of the eye to be fitted. Fortunately, more and more ophthalmologists do the entire fitting procedure within their offices, thus avoiding a dangerous gap in the supervision of the technical help.

Correct fitting of contact lenses will involve the use of eye drops, especially fluorescein sodium 1 per cent ophthalmic solution, which by its fluorescent quality under a Wood light will give a true reference concerning the crucially essential thickness of the tear film on which the contact lens rides over the cornea. This will also demonstrate any accidentally injured areas of the cornea. Only the medical eye specialist, the ophthalmologist, is qualified by training and experience to administer and correctly evaluate such diagnostic procedures. It is unlawful for anyone who is not licensed to practice medicine to administer eye drops into the eyes of a living person, be it for diagnostic or for therapeutic purposes.

Insertion and removal of contact lenses are easy and are usually learned in a few days even by the youngest patients. The ages of the patients fitted in my office with contact lenses range between 6½ and 83 years.

Wearing time varies, but most patients wear the contact lenses during the entire day. Some will prefer to wear them only for social functions; others derive great usefulness from the lenses in the business world.

Bifocal contact lenses are now functional and some patients find them quite acceptable. The most successful type of bifocal contact lens has the bifocal segment incorporated all around the small periphery of the corneal contact lens in the form of a ring. Of course, both the lens and its bifocal segment are completely invisible if properly fitted.

Pain should not be associated with contact lenses. Commercial contact lens fitters often try to reassure their unsuspecting customers that the pain will pass as soon as they become "adjusted" to the lens. Although discomfort is natural during the initial phase of the contact lens fitting, actual pain should not be experienced by the patient, and if it is, this is always a sign that something is wrong. Anesthetic drops should not be used under any circumstances because they cannot be considered harmless to the corneal epithelium and serve only to mask the actual clinical problem.

This author is in favor of contact lenses after proper selection of the patients. Such selection is a strictly medical ophthalmological task. The actual fitting prefer-

ably should be done by the physician in his office, restricting the technician to his laboratory. The technician's role is an important one requiring high skill, training, and experience. But this technical skill should never be erroneously confused with the role and responsibility of the physician.

G. *Peter Halberg, M.D.*
New York, N. Y.

Repair of Retinal Detachment

A procedure for the repair of retinal detachment, giving better results than "buckling" or "shortening" procedures, was reported at the Tenth Colombian Convention of Ophthalmology and Otorhinolaryngology. Eighty-two per cent of patients treated to date with this procedure showed "satisfactory" results.

The technique involves cutting of a scleral flap directly over the detachment; insertion of a twisted scleral strip, previously prepared and sutured to the scleral layer with igamid; and drainage of subretinal fluid by the use of a cibisotome. Repair of the scleral and conjunctival wounds is then done by the usual procedures under ophthalmoscopic control. The advantage of this procedure is that organic material is used, which is well tolerated, in preference to synthetic implants.

ABSTRACTS

MEDICAL OPHTHALMOLOGY

44. *An Ocular Study of Pulseless Disease.* J. L. DOWLING, JR., AND T. R. SMITH. A. M. A. Arch. Ophth. *64*:236–243, 1960.

The authors state that two types of this disease occur, the first being inflammatory (Takayasu's disease) and the second, an occlusive type, due to a diffuse and nonspecific arteritis. A case of the latter type is presented with post-mortem (four hours) ocular findings. The retinal vessels of one eye were injected with India ink and many microaneurysms, saccular and fusiform, were found. The sausage-shaped dilatations of the major veins were well shown. The walls of the aneurysms appeared to be as thick as the vessel walls. General pathological examination showed atherosclerosis of the aorta and great vessels. However, the vertebral arteries were patent and approximately twice normal size, showing less atherosclerotic changes than would be expected in a 54-year-old man.

The ocular changes in pulseless disease are related to prolonged retinal arterial hypotension, and it appears that essentially complete obstruction of both carotid arteries is necessary to produce typical ocular changes.—*Garrett L. Sullivan, M.D.*

45. *Deficiency Amblyopia in the Alcoholic Patient.* M. VICTOR, E. L. MANCALL, AND P. M. DREYFUS. A. M. A. Arch. Ophth. *64*:1–33, 1960.

On the basis of observations of 14 alcoholics, most of whom also used tobacco in excess, evidence is presented in support of the now generally accepted belief that the visual disturbance is due to nutritional deficiency. Significant improvement in vision occurred on improved dietary regime despite continued use of alcohol and tobacco. The authors found the amblyopia to be clinically indistinguishable from that occurring in prisoners of war and civilian internees in World War II when alcohol and tobacco played no role. One of the 14 patients came to post mortem and revealed degeneration of the papillomacular bundles in their course through the optic nerves, chiasm, and tracts, a finding similar to that reported in nonalcoholic deficiency amblyopia. The authors question the continued use of the term "tobacco-alcohol amblyopia."—*Garrett L. Sullivan, M.D.*

46. *Eye Disturbances in Bromide Intoxication.* M. LEVIN. Am. J. Ophth. *50*:478–483, 1960.

Although bromides have been largely replaced by the ataraxics, it is still worth while to bear in mind the eye symptoms of bromide intoxication. Pupillary changes, usually mydriasis with unequal pupillary size and sluggish reactivity to light, were the most frequent eye findings. Of less constancy are disturbances of color, form, size, and outline of objects, photophobia, diplopia, and visual hallucinations.

Bromide blood level should always be taken routinely on all acute cases admitted to a psychiatric service, and pupillary abnormalities in association with bizarre visual disturbances should raise the question of bromide intoxication.—*Carl Kupfer, M.D.*

47. *Modern Therapy in Uveitis.* D. M. GORDEN. Am. J. Ophth. *50*:236, 1960.

Corticosteroids and ACTH are at present the most important group of drugs in uveitis therapy. In the absence of specific etiology, all forms of uveitis should be treated with steroids. The author feels that undue emphasis has been placed on the usually unrewarding search for an etiological agent. Systemic steroids are routinely used by the author in all cases. In addition, topical steroids are used in anterior uveitis. The chief ocular complications are keratitis from herpes simplex, chickenpox, smallpox, and fungi. The guiding principles are the use of the drug soon enough, in a sufficient dosage, and long enough for an adequate clinical trial. Most failure results from insufficient dosage. A suggested initial dose is 6 to 8 tablets for anterior uveitis and 8 to 12 tablets for posterior uveitis. (The various forms of steroids are approximately equivalent to each other in tablet form. For example, 1 tablet is 4 mg. of methyl prednisolone or 0.5 mg. of dexamethasone.) Usually a beneficial response is evident within 96 hours in acute uveitis and within several weeks in chronic cases. If no result is observed within this time, increase the dosage and/or use an alternate form and/or try subconjuctival injections. Note that systemic contraindications do not apply to the use of topical or subconjunctival routes. If therapy is continued longer than two weeks, never stop abruptly at a high dosage level or a serious rebound may occur. When an obvious clinical improvement is visible, the daily dosage is decreased in decrements of ½ to 1 tablet every three or four days. In long-term therapy it is well to guard against the side effects of water retention and potassium loss by ordering potassium chloride (4.0 Gm.) daily and by restricting fluid and salt intake. Diuretics may be necessary.—*Ralph Z. Levene, M.D.*

48. *Ocular Complications in Sickle-cell Haemoglobin C Disease.* STEWART MUNRO AND COLIN WALKER. Brit. J. Ophth. *44*:1–24, Jan., 1960.

Sickle-cell hemoglobin C disease, which is found exclusively in the Negro race, is characterized by recurrent infarctive episodes, sometimes mild and asymptomatic but occasionally severe and fatal. The eye suffers recurrent intraocular hemorrhages, and other organs and tissues (notably the spleen, kidney, and bones) are affected by this infarction through the mechanical obstruction of the small capillaries by inflexible red cells. The author states that about 22 cases with ocular complications of this disease have been reported. He describes 9 additional cases. Sickle-cell anemia was first described by Herrich in 1910, but it was not known that the hemoglobin of the sickle cells had characteristic differences in its electrophoretic pattern.

The retinopathy of sickle-cell hemoglobin C disease is confined mainly to the periphery, which explains why it may be overlooked in a routine ophthalmological examination without dilatation of the pupil. The characteristic appearances of this retinopathy are: arteriovenous anastomotic communications with terminal bulbous

or varicose dilatations, brushlike terminations of the peripheral retinal capillaries and new vessel formation, peripheral areas of choroidal-retinal atrophy, peripheral fibrosis, curious "red" areas, which have been ascribed to thin preretinal or subretinal hemorrhages, thrombosed peripheral retinal veins, and exudative retinal detachment. Vitreous hemorrhage, uveitis, and cataract may be additional complications.

There is some evidence that acetazolamide reduces the number of sickling episodes in sickle-cell anemia, but this has not been demonstrated so far in sickle-cell hemoglobin C disease. Treatment of the ocular complications is not satisfactory. Rest is probably the best form of treatment at the present time.—*Thomas P. Kearns, M.D.*

49. *Vitamin Deficiencies in Relation to the Eye.* MEKKI EL SHEIKH. Brit. J. Ophth. *44*:406–414, July, 1960.

The results of a survey for ocular manifestations of vitamin deficiency in the Gezira-irrigated area, Blue Nile Province of the Sudan, are given. The series consisted of 1265 patients. Typical signs and symptoms of multiple avitaminosis were discovered in 85 per cent of the patients examined. Vitamin A deficiency was the commonest (56 per cent). The three cardinal ocular features of this deficiency are xerophthalmia, keratomalacia, and night blindness. Vitamin B-group deficiencies were the next most common (24 per cent). The ocular symptoms of this group were mild keratoconjunctival lesions, together with such symptoms as smarting and photophobia, and visual disturbances, including night blindness. Twenty-seven cases of retrobulbar neuritis thought to be related to B_1 avitaminosis were seen. Central and cecocentral scotomas were present. Nuclear ocular palsies of every type were seen. Vitamin C deficiency was the least common (5 per cent). Conjunctival and orbital hemorrhages were the main ocular features. The author points out that vitamin deficiencies are usually multiple and that often there is no sharp demarcation between one vitamin deficiency and another. For instance, xerophthalmia is often seen with rickets in cold climates; however, the author did not see a single case of ocular changes due to vitamin D deficiency in the Sudan.—*Thomas P. Kearns, M.D.*

50. *Cardiac Slowing During Squint Surgery.* HOWARD REED. Tr. Canad. Ophth. Soc. *21–22*:149–156, 1959.

Continuous electroencephalographic and electrocardiographic recordings were made during squint surgery. Three methods of preventing cardiac slowing were tested: retrobulbar local anesthesia, gallamine triethiodide, and atropine. After it was shown that the cardiac slowing occurred when traction was applied to the extraocular muscles, each form of therapy was tried. In the whole series 57 cases were studied.

It was not possible to predict the type of child who would be afflicted or the conditions that were likely to result in severe cardiac arrythmia. Retrobulbar local anesthetics gave poor protection against vagal inhibition. Gallamine triethiodide gave considerable protection against cardiac slowing. The usual dosage of atropine

given as a premedication before anesthesia gave incomplete protection. Intravenous atropine gave almost complete protection against vagal inhibition. 5 references. 5 figures.—*Clement McCulloch, M.D.*

51. *Allergie bacillaire oculaire.* JEAN LACERTE. Tr. Canad. Ophth. Soc. *21–22*:116–122, 1959.

Three cases of uveitis, the etiology of which was considered to be tuberculous, are described. While chemotherapy against the infection is helpful, the recurrence of the ocular inflammation is seen with tuberculin methylique.

The mechanism of action of methylique antigen is not known; however, chemotherapy against tuberculous uveitis is not sufficient to prevent recurrences and it is necessary to use the methylique antigen. Combined treatment, using the two methods, is preferred. 8 references.—*Clement McCulloch, M.D.*

52. *Nevoxanthoendothelioma with Ocular Involvement: Report of a Case.* M. SHUSTERMAN. Tr. Canad. Ophth. Soc. 22:206–215, 1959.

A white female infant had multiple yellowish skin nodules across the body at birth. When she was 2 weeks old, glaucoma was noted in the left eye, and goniotomy with goniopuncture was performed. When she was 3 months old, yellowish discoloration was noted where the conjunctiva had been grasped with fixation forceps. When she was 1 year old, these areas had grown to a maximum size, but by the age of 22 months they had disappeared. 6 references. 6 figures.—*Clement McCulloch, M.D.*

OPHTHALMOLOGY PER SE

53. *The Diagnosis of Corneal Herpes Simplex Infection by Fluorescent Antibody Staining.* H. E. KAUFMAN. A.M.A. Arch. Ophth. *64*:382–384, 1960.

A rapid (one-hour) method of determining the presence of herpes simplex virus in corneal scrapings is described using a fluorescein-labeled antibody technique. Such a technique is available in a number of medical centers and provides rapid screening for the presence of this particularly infective agent.

Of 17 cases, virus was isolated in 7 instances, and the fluorescein-labeled antibody technique was positive in these 7 instances. In 1 case virus was not isolated although there was staining by antibody.—*Carl Kupfer, M.D.*

54. *Electroretinography in the Differential Diagnosis of Visual Loss in Children.* G. GOODMAN AND H. RIPPS. A.M.A. Arch. Ophth. *64*:221, 1960.

The electroretinogram is of major importance in the differential diagnosis of visual defects in children and adults with normal eyes or minimal changes. In particular, when the youthfulness of the patient precludes the use of subjective test procedures, the electroretinogram is of particular importance. The fundamentals of electroretinograph recording and clinical interpretation have been reviewed. Emphasis has been placed on the diagnosis of congenital tapetoretinal disorders and complete

and incomplete forms of congenital cone blindness, conditions in which electroretinography has demonstrated a far greater incidence than was previously suspected. Although both disorders result from retinal abnormalities, the absence of fundus lesions in many of these cases has led to frequent misdiagnosis and instances in which amblyopia was mistakenly attributed to optic nerve or cerebral pathology. —*Ralph Z. Levene, M.D.*

55. *Congenital Dyslexia.* J. V. V. NICHOLLS. Tr. Canad. Ophth. Soc. *21–22*:45–55, 1959.

Three of every 4 children can learn to read with ease. The remainder are now classified as retarded, but 3 of 4 of these can learn to read well if presented with modifications of current teaching methods. The residue represents the effects of auditory defects, cerebral damage, or emotional disturbances. Ocular defects are only a contributing factor and do not initiate the difficulty. Early recognition is essential and a varied and elastic educational approach an absolute necessity. 30 references. —*Clement McCulloch, M.D.*

56. *Use of a Group Screening Test for Colour Vision Defects.* A. G. S. HEATHCOTE, D. H. BROOKS, AND A. L. MC KAY. Canad. M.A.J. *82*:1261–1264, 1960.

The 1955 Hardy, Rand, Rittler pseudoisochromatic plates were photographed and the resulting color transparencies were used as projection slides. Children were tested in groups. Each child was asked to write down or draw what he saw projected.

By this method, with satisfactory color reproduction of the plates and good projection, 80 per cent of the group tested were correctly distinguished as having no color defect. The remaining 20 per cent must be tested individually to determine whether or not any color vision defect exists. 5 references. 7 tables.—*Clement McCulloch, M.D.*

57. *Occupational Injuries to the Eye Resulting from Exposure to the Electromagnetic Spectrum.* R. D. BARRON. M. Services J. *16*:487–500, June, 1960.

Cataract resulting from ionizing radiation is described. It is pointed out that fast neutrons have a higher relative biological effect than gamma and x rays. A cataract from ionizing radiation has been seen after therapy about the eye, in industry, in persons working with cyclotrons, and after atomic bombing.

Ultraviolet rays are the cause of welder's flash and snow blindness.

Visible light may cause burns of the retina after watching the eclipse of the sun. However, industrially, lack of light may cause difficulty, a typical syndrome being miner's nystagmus.

Infrared rays may result in cataract, due to heating of the lens. Radar waves can cause cataract. This, also, is apparently due to heating of the lens.

The sudden flash of a high voltage electric current may produce a retinal burn and it may initiate the development of cataract.

Measures can be taken to reduce the incidence of injuries from the electromagnetic

spectrum. These include protective devices, controlled exposure, and shielding. When dealing with ionizing radiations, fractionation of the dosage may be helpful. 27 references. 1 figure.—*Clement McCulloch, M.D.*

58. *Photography of Lens Opacities by Trans-scleral Illumination.* A. J. OGG. Brit. J. Ophth. *44*:374–377, June, 1960.

The author discusses previous methods of photographing lens opacities. Finchan (1955) used a slit-lamp, while Douvas and Allen (1950) used a Nordenson retinal camera. Both of the methods show the opacities as dark areas against the red retinal reflex. In the author's method the cataract is focally illuminated by light introduced into the eye through the lower lid and sclera; reflected light from the fundus is kept to a minimum, and the lens opacities are seen as white areas against the dark fundus background. The apparatus used by the author was made from a cylindrical tin can in which was mounted an ordinary home photoflash bulb. Kodak Royal X Pan was used. Several photographs of various types of cataracts are shown.—*Thomas P. Kearns, M.D.*

59. *Weaknesses and Illnesses of the Eye Which Affect Highway Safety.* J. E. PELLETIER. Union méd. du Canada *89*:61–67, Jan., 1960.

The ophthalmologist is the one man capable of setting standards and examining the eyes with regard to highway safety. The examination should include determination of visual acuity, study of the visual fields, examination of the lens and the interior of the eye, study of refraction, and judgment of binocular vision and of color vision. In addition, the ophthalmologist should search for ocular diseases, such as cataract, glaucoma, strabismus, ocular muscles weaknesses, and diseases of the retina.

Poor night vision, alcohol, and glare are factors in automobile accidents.—*Clement McCulloch, M.D.*

60. *The Use of Floropryl in the Handling of Esotropia.* MAYNARD C. WHEELER. Tr. Canad. Ophth. Soc. *21–22*:137–145, 1959.

There are several indications for the use of isoflurophate in the handling of esotropia. It may be used for diagnosis. If the deviation is not reduced, the drug is discontinued. If the squint straightens, the drug may be continued and a cure may be obtained with the help of medicine. The most favorable cases are those with a small deviation of late onset. Some older patients do not like wearing glasses and they are helped by the drug. Postoperative undercorrections and final straightening may be obtained with the help of the drug.

The drug seems to act only in response to the stimulus of accommodation; therefore, it acts more in persons with a high hypermetropia than in those with a low hypermetropia.

The only significant complication has been the production of nodules at the pupillary border of the iris. 4 references. 1 figure.—*Clement McCulloch, M.D.*

61. *Amblyopia Associated with Eccentric Fixation.* W. P. CALLAHAN, W. SAMIS, AND S. A. FINCH. Tr. Canad. Ophth. Soc. *21–22*:129–136, 1959.

Approximately a quarter of the children treated at the Hospital for Sick Children, Toronto, with uniocular strabismus, had an amblyopic eye, and a quarter of these had eccentric fixation refractory to occlusion of the normal eye. There are four types of eccentric fixation: Fixation is eccentric, nonfoveal, and unsteady. Fixation is eccentric and steady but there is no attempt at peripheral fusion. Fixation is eccentric and unsteady and a type of peripheral fusion is demonstrable. Fixation is eccentric and steady; simultaneous macular perception, fusion, and stereopsis exist at the angle of anomaly.

Cuppers and Bangerter's method of treatment is described. 2 figures.—*Clement McCulloch, M.D.*

62. *Transverse Myotamies to Lengthen Ocular Muscles.* A. L. MORGAN AND MARIA ARSTIKAITIS. Tr. Canad. Ophth. Soc. *21–22*:146–148, 1959.

Vertical imbalance after the operation has not been encountered. The operation has been combined with resection in certain cases.—*Clement McCulloch, M.D.*

63. *Exogenous Fibers of the Retina.* M. MATHIEU AND J. VENTURA. Tr. Canad. Ophth. Soc. *21–22*:184–196, 1959.

Using human, dog, cat, and rabbit retinas prepared by a modified Gros-Bielchowsky method, different types of centrifugal fibers were found. The axons emerge from the optic disc and extend in a radiating fashion toward the periphery, to end in the ganglion and flexiform layers. A number of these fibers, which seem to begin in the proximal areas of the retina, form collateral branches several millimeters from the disc. Other fibers reach the periphery and divide into long lateral branches. These lateral branches turn parallel to the ora serrata and terminate in arborizations. The role of these neurofibers is known, but their physiological function is not clear. 12 references. 16 figures.—*Clement McCulloch, M.D.*

64. *Retinoschisis.* M. SHEA, C. L. SCHEPENS, AND S. R. PIRQUET. Tr. Canad. Ophth. Soc. *21–22*:170–183, 1959.

The condition of senile retinoschisis is described as it appeared in a group of 107 patients. At first it appears as an exaggeration of cystoid degeneration of the peripheral retina. Scleral indentation produces the appearance of "white with pressure." The condition extends to encompass all the periphery of the fundus. It progresses from the temporal region toward the optic disc. Finally, it forms large cystlike elevations in the inferotemporal or superotemporal quadrants.

The field defect is absolute with sharp boundaries in the upper nasal field. The refractive errors are not significantly different from those in the general population. Male and female patients are approximately equally involved. Bilaterality is a typical clinical feature, and the lesions are usually symmetrical. Symptoms are related to reduction in visual acuity, light flashes and floating bodies, and peripheral field

loss. Serious symptoms such as loss of sudden vision are due to retinal detachment. Retinal breaks may be found in one of the layers of the retinoschisis.

The condition must be differentiated from cystoid degeneration of the peripheral retina, retinal cyst, and retinal detachment.

Senile retinoschisis slowly progresses. The great danger is development of retinal breaks in both layers, with subsequent retinal detachment. If the retinoschisis involves only the extreme periphery, the patient should be examined yearly. Diathermy application should be used solely to make a wall of reaction in normal retina posterior to the splitting. 27 references. 3 figures. 5 tables.—*Clement McCulloch, M.D.*

65. *Acute Dacryocystitis in a Two-Month Old Baby.* R. G. C. KELLY. Tr. Canad. Ophth. Soc. *21–22*:216–218, 1959.

Acute dacryocystitis in a 2-month-old baby is described. It is rare for such a young child to develop acute dacryocystitis. Kelly believes that dacryostenosis should be treated before 2 months of age. It is easy to probe a 2 or 3-week-old baby in the office, without the use of general anesthesia.—*Clement McCulloch, M.D.*

66. *Symposium on Strabismus.* J. S. CRAWFORD, MODERATOR; J. AUDET, W. C. GUEST, L. S. S. KIRSCHBERG, A. L. MORGAN, M. C. WHEELER, AND W. M. G. WILSON. Tr. Canad. Ophth. Soc. 22:235–266, 1959.

A number of problems related to the clinical study and management of cases of strabismus are discussed. Subjects discussed include the drugs preferred for refraction, the minimum refractive error that warrants the use of glasses, subjective tests used on children, the use of occlusion, the use of miotics and bifocal glasses, and the value of orthoptics. The choice of an anesthetic agent for surgery, discussion of the surgical treatment of squints, discussion of the retraction syndrome, superior oblique tendon sheath syndrome, and the blind spot syndrome, and over-all results completed the symposium.—*Clement McCulloch, M.D.*

67. *Retinal Detachment.* S. B. MURPHY AND W. TURNBULL. Tr. Canad. Ophth. Soc. *21–22*:197–205, 1959.

One hundred and twenty-two patients with retinal detachment, operated on at the Royal Victoria Hospital, Montreal, were reviewed. Fifteen patients were operated on by retinopexy, 27 by lamellar scleral resection with diathermy, 19 by scleral enfolding, 11 by vitreous implant with retinopexy, and 12 by circling polyethylene tube.

In 26 of 27 eyes with one retinal break, reattachment was obtained. In 13 of 17 eyes with multiple retinal breaks, reattachment was obtained, and in only 3 of 6 cases of disinsertion was the retina put back in place. Lamellar scleral resection was successful in 9 cases of one retinal break, in 5 of 12 cases of multiple retinal breaks, in 2 cases of disinsertion, in 2 of 4 cases of no retinal visible break. Scleral enfolding was successful in 2 of 3 cases of one retinal break, 5 cases of multiple breaks, and 4

cases of disinsertion. Vitreous implant with retinopexy was found successful in 2 of 2 cases of one retinal break, 4 of 6 cases of multiple retinal breaks, and 2 of 3 cases of disinsertion. Circling polyethylene tube was successful in 7 of 7 cases of multiple retinal breaks.

A good surgical result was obtained in 85 per cent of the cases in which retinopexy was done, 66 per cent of the cases in which scleral resection with diathermy was done, 58 per cent when scleral enfolding was done, 72 per cent when vitreous implant was done, and 91 per cent when circling polyethylene tube was used. 6 tables.—*Clement McCulloch, M.D.*

GLAUCOMA AND INTRAOCULAR PRESSURE

68. *Peripheral Iridectomy with Scleral Cautery.* G. S. TYNER, D. D. LAHEY, J. E. ELLIFF, AND H. E. WATTS. A.M.A. Arch. Ophth. *64*:268, 1960.

The authors present their operative results in 42 eyes with various types of glaucoma, using the recently devised Scheie procedure. The operation consists essentially of a wide limbus-based conjunctival flap, a scratch incision over the root of the iris into the anterior chamber, cautery to the lips of the wound to cause a slight retraction, and a peripheral iridectomy. In most cases instrumental entry into the anterior chamber is unnecessary. Of the 42 eyes, 28 were normotensively controlled without miotics, six were controlled with hypotony, and eight were uncontrolled. Delayed re-formation of the anterior chamber was the most common complication. The authors' results are similar to those obtained by other investigators with this operation. In comparison with the results and complications of iridencleisis and corneal scleral trephination, the Scheie procedure may prove to have a higher rate of success, somewhat fewer complications, and a wider application.—*Ralph Z. Levene, M.D.*

69. *Ethoxzolamide (Cardrase) in the Management of Chronic Simple Glaucoma.* S. M. DRANCE. A.M.A. Arch. Ophth. *64*:433–437, 1960.

A carbonic anhydrase inhibitor was tested in 18 cases of glaucoma uncontrolled by other forms of medical therapy. About one half the cases were considered controlled on this medication combined with miotics. Of interest is that, of the cases not controlled, one half had to stop this medication because of side effects of dizziness, anorexia, loss of weight, and, in 1 case each, muscle cramp and generalized skin eruption. This drug should be considered in the medical treatment of glaucoma but the side effects must be kept in mind. It is a valuable adjunct for patients who are sensitive to other oral carbonic anhydrase inhibitors.—*Carl Kupfer, M.D.*

70. *The Effect of Intraocular Pressure in Outflow Facility.* M. F. ARMALY. A.M.A. Arch. Ophth. *64*:155, 1960.

The resistance of the aqueous outflow passages, in the enucleated eye of the rabbit and cat, was found to be dependent on the intraocular pressure level and to increase with it. This effect was immediate and reversible. This effect should not be con-

fused with the opposite generally accepted belief that in glaucoma, the level of intraocular pressure is to a large extent dependent on the resistance to aqueous outflow. If the author's results can be confirmed in vivo, the causal relationships between intraocular pressure and outflow resistance will be more complex than is presently assumed.—*Ralph Z. Levene, M.D.*

71. *Intraocular Tension in Association with Succinylcholine and Endotracheal Intubation: A Preliminary Report.* J. E. WYNANDS AND D. E. CROWELL. Canad. Anaesth. Soc. J. 7:39–43, Jan., 1960.

A single intubating dose of succinylcholine, which wears off in four to five minutes, results in a significant rise in ocular pressure in about 50 per cent of individuals. The depolarization of skeletal muscles is accomplished in four to five minutes with .01 per cent succinylcholine drip, when fasciculation is not a feature of depolarization. For practical purposes, no increase in ocular pressure occurs. Once a person is clinically depolarized, the further administration of succinylcholine does not lead to an increase in ocular tension. The extraocular muscles behave like skeletal muscles with the exception that large amounts of circulating succinylcholine are required to produce equivalent amounts of relaxation.

A single large injection of succinylcholine should never be administered when the eye is opened during intraocular surgery. 8 references. 2 tables.—*Clement McCulloch, M.D.*

72. *Iridectomy with Cautery.* S. Y. SHIRLEY. Canad. M.A.J. *82*:1122–1123, 1960.

This is a report of a series of 15 eyes that were treated by iridectomy with cautery of the scleral wound. In eight eyes flat anterior chamber followed operation, lasting from 5 to 10 days. In six eyes the ocular tension was reduced to less than 10 mm. of mercury. Only 1 patient had closure of the filtering bleb. 4 references. 1 table. —*Clement McCulloch, M.D.*

73. *Glaucoma in Children.* T. PASHBY, M. ARSTIKAITIS, AND R. COLLYER. Tr. Canad. Ophth. Soc. *21–22*:92–107, 1959.

During the past 10 years, 110 children (177 eyes) were seen and treated for glaucoma. There were 66 cases of congenital glaucoma, with a predominance of male patients. There was a tendency for delay in initial treatment of unilateral cases. The average corneal diameter of the glaucomatous eyes was 14 mm. If the optic disc was normal, the tension was always controlled.

Multiple operations frequently led to a favorable result, but fifth and sixth operations had only a small chance of success. The use of acetazolamide was found helpful. Only 10 per cent of the children in whom the glaucoma was controlled will require institutional care.

Phacogenic glaucoma was of phacoanaphylactic, phacotopic, phacomorphic, and capsular types. There were 10 cases in this group. Fifteen cases of post-traumatic glaucoma were seen. The peak incidence of secondary glaucoma was on the second day after the injury. Patients were treated with five days' bed rest, binocular band-

age, and sedation as necessary. Mydriatics have not been used. Acetazolamide has been found helpful. Glaucoma after a penetrating injury was seen in three eyes, postinflammatory glaucoma was seen in five, and glaucoma followed Sturge-Weber disease in six. Glaucoma was seen complicating aniridia in 3 cases, retrolental fibroplasia in 2. There was 1 case of bilateral pigmentary glaucoma. 4 references. 11 figures.—*Clement McCulloch, M.D.*

74. *Reactions oculaires à l'hydratation et à la deshydratation. Myopies, hypermétropie et glaucome.* (The Ocular Changes During Hydration and Dehydration. Myopia, Hypermetropia and Glaucoma.) M. PLAMONDON. Laval méd. 30:45–66, June, 1960.

During dehydration the eye shows hypotony, a shrinking of the lenticular nucleus, a condensation and retraction of the vitreous body, an exaggeration of passive aqueous diffusion by the iris, atony of the ciliary muscle, and relaxation of the elastic fibers in the sclera.

Ocular hydration is accompanied by hypotony, hydration of the cortical part of the lens, and gelfaction of the vitreous. The ciliary muscle becomes more tonic and the scleral elastic fibers taut. There is hypermetropia and shortening of the globe. Chronic hydration puts the eye in a state of preglaucoma. 47 references.—*Clement McCulloch, M.D.*

75. *Phospholine Iodide (217 MI) and Demecarium Bromide (BC 48) in the Management of Glaucoma.* S. M. DRANCE. Tr. Canad. Ophth. Soc. 21–22:84–91, 1959.

This is a report of the use of these drugs in 65 eyes. Thirty-five eyes were treated with phospholine iodide, 0.1 or 0.25 per cent, and 30 with demecarium bromide, 0.25 per cent. When phospholine iodide was used, 55 per cent of the cases were considered controlled and 45 per cent not controlled; with the addition of carbonic anhydrase inhibitors, control was attained in 79 per cent. When demecarium bromide was used, 64 per cent were controlled and 36 per cent were not controlled. With the addition of carbonic anhydrase inhibitor, 78 per cent were controlled. The side effects were pain in the eye over the brow, conjunctival injection, and lachrymation or visual disturbance. One patient showed generalized reaction to phospholine iodide; 1 patient developed iritis when demecarium bromide was used. The drugs were considered valuable in the treatment of chronic glaucoma. 6 references. 1 table.—*Clement McCulloch, M.D.*

CATARACT SURGERY

76. *Chymotrypsin in Cataract Surgery.* HOWARD REED. Canad. M. A. J. 82:767–770, April 9, 1960.

Chymotrypsin was used in 83 cases, Quimotrase in 23 cases, making a total of 106 cases. During the same period, operation was performed in 107 cases without the use of enzyme. In the series in which enzyme was used, there were fewer ruptured capsules, more vitreous loss, more postoperative choroidal attachments, but

fewer flat anterior chambers. The final visual result was not better in the series in which enzyme was used.

The eye must be soft when operating with the help of chymotrypsin. There was no evidence in this series that the enzyme had damaged other ocular tissues. Corneal edema and striate keratitis and corneal vascularization were not marked. 11 references. 6 tables.—*Clement McCulloch, M.D.*

77. *Alpha-Chymotrypsin in Cataract Surgery.* D. G. SIMPSON. Canad. M. A. J. *82*: 771–772, April 9, 1960.

Thirty-two cataract extractions were performed using α-chymotrypsin.

One case of late mild iritis, 1 of severe and 1 of mild endophthalmitis, and 1 of severe late hemorrhage may have been attributable to the enzyme. 17 references.—*Clement McCulloch, M.D.*

78. *The Use of Alpha Chymotrypsin in Cataract Surgery.* R. G. MURRAY AND S. M. DRANCE. Tr. Canad. Ophth. Soc. *21–22*:66–83, 1959.

The enzyme was used on 42 eyes. Two hundred eyes in which the enzyme was not used were taken as controls. The use of the enzyme resulted in a decrease in the instance of rupture of the capsule, but a marked increase in the instance of iris prolapse and vitreous loss. The visual results were not as good as when the enzyme was used. In the younger age group, it was shown that the number of complications were significantly less when the enzyme was used. If one decides to use the enzyme, the patient should be given a general anesthesia and then the extraction should be done. Also, the lens should be fixed immediately after the injection of the enzyme. Considerable corneal reaction was found when the enzyme was used. 11 references. 6 tables.—*Clement McCulloch, M.D.*

79. *Management of the Flat Anterior Chamber After Cataract Extraction.* G. V. SIMPSON. Tr. Canad. Ophth. Soc. *21–22*:56–65, 1959.

There are two types of flat anterior chamber: first, the case in which the aqueous does not return to the anterior chamber after operation; second, the case of a properly filled anterior chamber that suddenly becomes flat between the sixth and twenty-first days after operation. In cases of late flattening of the anterior chamber, medical measures such as rapid dilation of the pupil, reapplication of a dressing, and moderate rest have resulted in re-formation of the anterior chamber.

Delay in re-formation of the anterior chamber after surgery is frequently followed by aphakic glaucoma. The basic irregularity is a leaking wound in the first few hours after surgery. Then transudate forms in the subchoroidal space. There is a decrease in aqueous formation. The aqueous that is formed cannot reach the anterior chamber because the openings in the iris are plugged with vitreous.

The clinical features after five to seven days of flat anterior chamber are edema of the lids, red sensitive eye, edema of the cornea, a flat chamber, lack of response to the iris. The eyeball is soft. There may be a peripheral choroidal detachment.

Prophylaxis includes minimizing trauma to the eyeball during operation and

avoidance of a leak of the ocular wound. A leaking wound may be avoided by three well-placed corneal-scleral sutures, a properly placed section, a peripheral iridectomy, careful closure, and preventing the patient from vomiting and coughing. If the anterior chamber is flat, the pupil should be dilated. Both eyes should be kept covered, and the patient should be mildly sedated; acetazolamide can be used. If operation must be resorted to, the preferred operation is posterior sclerotomy in the nasal and temporal quadrants with the injection of air in the anterior chamber. 10 references.—*Clement McCulloch, M.D.*

80. *Some Useful Aids in Eye Surgery.* J. GRAHAM GILLAN. Tr. Canad. Ophth. Soc. *21–22*:123–128, 1959.

α-Chymotrypsin is helpful when performing cataract extractions in persons of the age group 45 to 55 years.

Fuchs's syringe is a useful instrument to irrigate the anterior chamber and to wash out either lens material or blood.

Gelfilm has been found helpful when placed under muscles during operations for squint and when placed in an area of filtration to be the basis for the formation of a filtering bleb. 4 references.—*Clement McCulloch, M.D.*

81. *Macular Edema Following Cataract Extraction as Demonstrated by After-Image Scotometry.* J. C. LOCKE. Tr. Canad. Ophth. Soc. *21–22*:219–234, 1959.

Afterimage scotometry is done by shining a bright light from an ophthalmoscope on the central retina for 15 seconds and then plotting the resultant afterimage. In normal eyes the scotoma has been found to disappear within two minutes. The test is considered positive when the afterimage persists for more than three minutes. The test is considered to be indicative of shallow separation of the retina in the macular area.

The test was positive in 23 of 25 eyes examined early after cataract extraction. In 16 of the 23 eyes, the test became negative at times varying from four weeks to four months after operation. Locke concludes that macular edema is common after cataract extraction.

The test was also found positive in 10 of 26 eyes at a later period after cataract extraction. In certain of the cases the test was positive in the fellow eye. Macular edema of the type found by this test probably is an important cause of lowering of vision to the 20/30 range and for delaying the final optimal visual result. So-called delayed macular edema after cataract surgery is probably most often exacerbation of an already existing edema. Also, macular edema after cataract surgery may represent edema that was present before operation.—*Clement McCulloch, M.D.*

NEURO-OPHTHALMOLOGY

82. *Trauma to the Head and Associated Ocular Signs.* F. B. WALSH AND D. L. KNOX. Canad. J. Surg. 3:203–224, April, 1960.

Trauma is a factor responsible for rupture of the carotid artery into the cavernous

sinus. The signs and symptoms include bruit, which may be heard by both the patient and the physician, visible pulsation of the eyeball and orbit, exophthalmos, diplopia, headache, disturbances of the vision of the optic fundi and the ocular tension. Signs may be related to the eye opposite to the diseased side, presumably from an abnormally wide communication between the cavernous sinuses. Early operation is generally advisable. At the present time there is a tendency toward a combined procedure of ligating the carotid artery intracranially and in the neck and ligation of the ophthalmic artery.

Aseptic thrombosis of the cavernous sinus affects the sinus on one side only, in distinction to septic thrombosis, which is bilateral.

Angiography may produce ocular and cerebral complications, presumably as a result of intracranial venous stasis associated with rapid rise of intracranial pressure. It is probably advisable to avoid bilateral filling of the carotid arteries in patients who have had a cerebral vascular accident.

Extradural hemorrhage usually occurs from the middle meningeal artery or vein. Slight trauma may be responsible for the syndrome, particularly in children. The symptoms to be noted are loss of consciousness after a latent period in which it seems that the injury has done no harm. Evidence of increasing intracranial pressure then appears, followed by coma and death. There may be focal convulsions. Ocular signs include pupillary widening with slower or absent response to light. Paresis of all the extraocular muscles and congestion of the eye homolateral to the lesion may occur.

Acute subdural hematoma is depicted by the case of Abraham Lincoln. A heavy bullet perforated the skull in the left occipital region, penetrated the dura, passed along the left lateral sinus, and lodged anterior to the left corpus striatum. Both orbital plates were fractured. There was a right subdermal hematoma and hemorrhage into the orbits with proptosis.

Chronic subdermal hematomas are frequent in children and in adults from 20 years of age to late adult life. There is a period when there are no symptoms. In infants, convulsions and progressive enlargement of the head form the principal evidence of subdural hematoma. In adults headache, drowsiness, mental confusion, and irritability are characteristic. Nausea and vomiting, vertigo, tinnitus, diplopia, convulsions, hemiparesis, and loss of vision and of hearing may be found. There may be little evidence of a lesion. Diagnosis is usually established by arteriography, or air injection, or at operation. Ocular signs include pupillary dilation; this may occur due to herniation of the hypocanthal gyrus, distortion of the midbrain, or hemorrhage into the midbrain. In infants this is not as important a localizing sign as it is in adults. There may be conjugate deviation of the eyes away from the side of the lesion, exophthalmos, papilledema, homonymous hemianopia, visual field defects, and palsies of the extraocular muscles. 35 references. 27 figures.—*Clement McCulloch, M.D.*

83. *Optic Neuritis in Children.* L. A. LLOYD. Tr. Canad. Ophth. Soc. *21–22*:108–115, 1959.

This is a review of 12 cases of optic neuritis seen in children at the Hospital for

Sick Children, Toronto, between 1952 and 1958. Only 2 had optic neuritis without other evidence of neurological or systemic disease. Diagnosis in these cases included Leber's disease, Devic's disease, and encephalitis. Steroid therapy was considered helpful in 2 cases. 1 figure. 2 tables.—*Clement McCulloch, M.D.*

84. *Herpes Zoster Ophthalmicus Complicated by Contralateral Hemiplegia.* H. WYATT LAWS. Tr. Canad. Ophth. Soc. 21-22:157-169, 1959.

A case of herpes zoster ophthalmicus complicated by contralateral hemiplegia in a 65-year-old woman is reported. This is the sixth case that has appeared in the literature. The trigeminal nerve lies close to the middle cerebral artery. A clot in the lenticulostriate artery could easily lead to a vascular accident in the ipsilateral hemisphere and contralateral hemiplegia. 59 references.—*Clement McCulloch, M.D.*

BOOK REVIEWS

Glaukom. WOLFGANG LEYDHECKER. Berlin, Springer Verlag, 1960. Pp. 660. Price $10.00.

Leydhecker has made an exceedingly valuable contribution to the important problem of glaucoma in this unusually well-organized book.

The writing is clear and includes the material that has appeared between the years of 1930 and 1958. The review of the literature is exact and complete, and the author and subject indexes permit one to rapidly find desired information. The clarity of the German text and the fact that all but essential material has been omitted make this reference work interesting reading.

Several excellent tables compiled by the author makes it easy to find and understand much valuable data.

Illustrations would have added interest to this fine work, which should be translated into English.—*Conrad Berens, M.D.*

Eye and Virus. ROGER NATAF, PIERRE LEPINE, AND GEORGES BONAMOUR. Paris, French Ophthalmological Society, 1960.

This volume, a monumental undertaking, was commissioned by the French Ophthalmological Society and presented by the authors as a report at the annual meeting of the society in May, 1960. It is divided into four more or less independent sections.

Part 1 deals with general virology, including, first, excellent discussions of the nature and characteristics of viruses and, then, the role played by viruses in genetics, cancer, and immunity. There follows a section on the pathology of the ocular manifestations of viral diseases. Finally, there is a most worth-while chapter on the laboratory methods available to the ophthalmologist in the diagnosis of ocular virus diseases.

Part 2 is comprised of a broad discussion of ocular viruses, the subject matter being subdivided anatomically. In turn, viral afflictions of the lid, conjunctiva, cornea, sclera, lachrymal apparatus, uveal tract, optic nerve, extraocular muscles, and retina are discussed in separate chapters. The chapter on trachoma is most extensive

and includes recent research on the isolation and culture of the virus. Part 2 concludes with a chapter on the ocular viral embryopathies, devoted to congenital viral lesions. The disease syndromes include rubeola, mumps, viral hepatitis, poliomyelitis, encephalitis, vaccinia, etc. The pertinent ocular lesions described include cataract, retinitis pigmentosa, microphthalmos, and buphthalmos.

Part 3 is devoted to ocular manifestations during the course of systemic viral diseases. The subdivisions are according to dermotropic, neurotropic, septicemic, and endo-mesodermal viruses, and, finally, the adenoviruses.

In part 4 are discussed syndromes believed to be viral in origin. In this category, one finds excellent discussions of Reiter's disease, Stevens-Johnson disease, pemphigus, Kaposi's disease, Behçet's disease, and the uveomeningitic syndromes of Harada, Vogt-Koyanagi, and sympathetic ophthalmia.

The text concludes with a chapter on the latest aspects of therapeutics in viral diseases.

Bibliographies at the end of the individual chapters are more than adequate. The colored plates, although not plentiful for a volume of this size, are outstandingly demonstrative of the pertinent lesions.

In a text of this magnitude, it is difficult to avoid a certain amount of repetition, particularly when multiple classifications of the subject matter are used, as the authors have done. Thus we find, for instance, that herpes may be discussed, although from different standpoints, under both keratitis and dermotropic viruses. Several other viral ocular manifestations are subjected to repeated discussions in two or more chapters, for the sake of completeness. However, this fact does not detract from the over-all excellence of the text, which is extremely well written. The subject matter is thoroughly and systematically covered, from prophylaxis to therapy. The authors have filled admirably a longstanding void in the ophthalmic library with an outstanding book; it is to be hoped that an English translation will be forthcoming in the near future.—*Gerald B. Kara, M.D.*

Ophthalmological Meetings

The annual Barraquer Institute Postgraduate Course in Ophthalmology will be held May 1–7, 1961, at the Institute, Barcelona, Spain. Subjects to be emphasized include corneal surgery and cataracts.

The French Ophthalmological Society will meet May 7–14, 1961, in Paris.

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by Walther Riese, M.D.

Associate Professor of Psychiatry and Neurology: Chairman, Department of the History of Medicine, Medical College of Virginia, Richmond, Virginia Consulting Neuropathologist to the Department of Mental Hygiene and Hospitals of the Commonwealth of Virginia

Here is a new approach to the history of neurology. With an historian's eye for the dynamic, the author has chosen to focus on "the great and lasting problems" that have remained inherent in man's endeavor through the ages to understand the functions of the nervous system and their disturbances. By concentrating on fact, thought, and theory, Dr. Riese has achieved a comprehensive picture of neurologic progress.

Dr. Riese traces the history of the doctrine of cerebral localization, its scope, limits, and different versions, both past and present. Other sections of special interest include those on the history of diagnosis, prognosis, and therapy in neurology; and a comprehensive treatment of the history of diaschisis or cerebral shock. Also included are invaluable sections: neurological chronology; list of journals specializing in neurology and neurological societies and associations.

This volume is one of a series devoted to the histories of various specialties and facets of medicine. Félix Martí-Ibáñez, M.D., who wrote the foreword to *A History of Neurology*, is the Editorial Director of the series, which includes Public Health and Ophthalmology.

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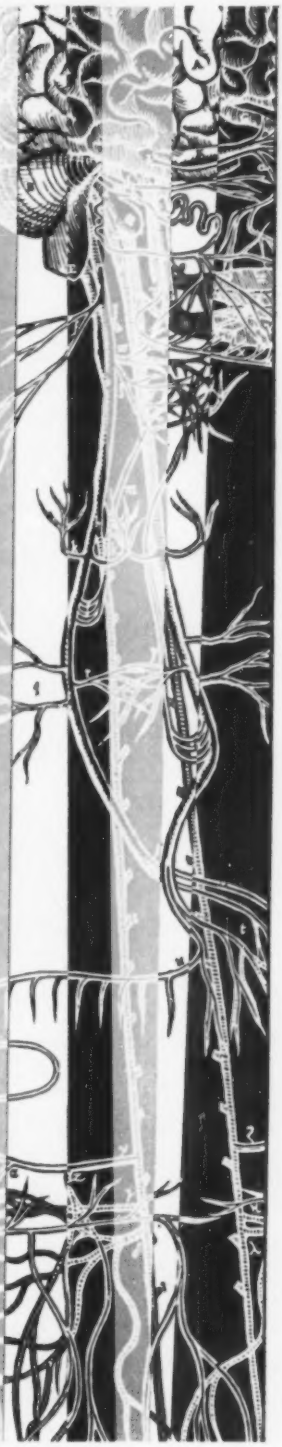

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by George E. Arrington, Jr., M.D.

Associate in Ophthalmology, Medical College of Virginia, Richmond, Virginia

A HISTORY OF OPHTHALMOLOGY provides an over-all view of ophthalmological progress through the ages. With scholarship and originality the author traces the thinking, of men known and unknown, that has made possible the technological advances of this science. Man's search for understanding of vision and its preservation is shown effectively in its relation to the history of civilization. The content of this book ranges from the period of prehistorical ophthalmology to the present day. In emphasizing the effect of related sciences, philosophy, and human culture upon ophthalmology, Dr. Arrington offers new insight into his subject. Appropriate attention is given the ascendancy of modern ophthalmology including an evaluation of its current trends in the light of the future. It is a book of interest to ophthalmologists, general practitioners, and students.

This volume is one of a series devoted to the histories of various specialties and facets of medicine. Félix Martí-Ibáñez, M.D., who wrote the foreword to A HISTORY OF OPHTHALMOLOGY, is the Editorial Director of the series, which includes books on Public Health and Neurology.

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